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Thesis

THE CONSTRUCTION AND VALIDATION OF A TEST OF CERTAIN WORD ANALYSIS ABILITIES FOR JUNIOR-SENIOR HIGH SCHOOL PUPILS

Submitted by

Olive Stafford Miles

(B. A., Mount Holyoke College, South Hadley, Massachusetts, 1930)
(M. A., Bryn Mawr College, Bryn Mawr, Pennsylvania, 1931)

In partial fulfillment of the requirements for the degree of

Doctor of Education

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First Reader: Donald D. Durrell, Professor of Education

Second Reader: Helen A. Murphy, Professor of Education

Third Reader: Roy O. Billett, Professor of Education

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The writer also wishes to express appreciation to the principal and teachers in the Central Grammar School of Gloucester, Massachusetts, and also to the administrators and teachers of the High School, the Beebe Junior High School, the Browne Junior High School, and the Lincoln Junior High School of Malden, Massachusetts. In these schools the testing procedures necessary to the study were conducted.

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CHAPTER I

INTRODUCTION

Efficient word recognition and spelling appear to depend on the possession of a number of skills, among them auditory discrimination and recall of separate sounds or combinations of sounds, auditory discrimination of syllables, blending of sounds and syllables, visual discrimination, and visual recall. These skills are usually taught to children before they have completed the sixth grade. If they have not been taught by that time, they probably will not be a part of any formal instruction except in remedial cases.

There is much evidence of the importance of these skills to the reading and spelling programs of the elementary school. Many materials and methods have been devised for teaching them to young children. Their importance to pupils in the secondary school has not been similarly investigated.

Some opinions have been expressed. For example, Triggs [1/] states that she believes these skills should be taught even at the college level.

> When he (the college student) learns these word recognition skills, ...his spelling improves and his technical vocabulary improves. He reads with more ease. He must usually have remedial work in other areas, critical reading, getting the main thought, drawing conclusions, drawing inferences, and others, but basic to that instruction is his ability to divide words into syllables and sound them.

1/Frances Oralind Triggs, "The Development of Measured Word Recognition Skills, Grade Four Through the College Freshman Year." Educational and Psychological Measurement, Vol. 12, No. 3 (Autumn, 1952), p. 348.

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Many questions arise in connection with the testing and teaching of these skills in the secondary school. Obviously, most junior and senior high school pupils have acquired a reasonable degree of proficiency and do not need further training. In the case of good readers and spellers, it is safe to assume that this is the case. Among poor readers and poor spellers, however, inadequate mastery of the basic visual and auditory skills may be one of the reasons for lack of success. Remedial help can be given much more efficiently whenever it is possible to identify specific causes of difficulty. For the purpose of diagnosis a reliable group test should prove very useful.

The main purposes of this study are

-- to construct and evaluate a group test for measuring certain word analysis abilities of secondary school pupils

-- to investigate the extent to which these abilities are possessed among a representative population at three grade levels: seven, nine, and eleven

-- to examine the relationship of the abilities as measured by the test to achievement in reading and spelling.

Difficulty arises in connection with the technical terms used in discussing word analysis ability. The use of the terms in the professional literature is not consistent. For the purpose of reporting the results of this study and also of discussing the findings of previous research, the writer has used the following terms with the meanings as indicated:

<u>auditory discrimination</u>: ability to distinguish the sound of one word or word part from another

<u>auditory recognition</u>: the ability to distinguish the sound of one word

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<u>auditory discrimination</u>: ability to distinguish the sound of one word or word part from another

<u>auditory recognition</u>: the ability to distinguish the sound of one word

or word part from another and to select from among several possibilities the letter or combination of letters which represents the sound heard. This ability is a combination of auditory and visual skill but with emphasis on the auditory.

auditory recall: the ability to distinguish the sound of one word or word part from another and to retain the sound in mind long enough to translate it into the corresponding visual symbol. This is actually the process involved in spelling from sound.

visual discrimination: the ability to distinguish one letter or combination of letters from another

visual recognition: the ability to perceive accurately the visual form of a letter or combination of letters and to select from among several possibilities the letter or combination of letters which is the same as the one seen

visual recall: the ability to perceive accurately the visual form of a letter or combination of letters and to retain the form in mind long enough to reproduce it in written form

blending: the act of combining sounds into syllables and words

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CHAPTER II

REVIEW OF RESEARCH

Word analysis is a complex process involving a number of different abilities. The foundation is built on accurate auditory and visual discrimination. Auditory discrimination is the ability to distinguish the sound of one word or word part from another. Visual discrimination is the ability to distinguish one letter or combination of letters from another.

Auditory recognition and recall are based on the act of auditory discrimination, but they involve a higher order of skill. The reader not only must discriminate one sound from another; he must also identify the sound and associate it with its visual symbol, either to the point of recognizing the correct visual symbol from among others, as in the act of recognition, or to the point of translating it into a visual symbol, as in the act of recall. Visual recognition, likewise, involves a higher degree of skill than mere visual discrimination. In visual recognition, the reader perceives accurately a visual form and selects that form from among several possibilities. In visual recall, he perceives the visual form and reproduces it from memory.

Efficient word analysis requires both phonetic analysis and structural analysis. Both involve combinations of auditory and visual skills. Phonetic analysis is the process of recognizing and producing the sounds of letters and combinations of letters when the visual symbols are presented. Structural analysis is the process of both auditory and visual division of

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a word into its component parts for the purpose of determining its pronunciation. The parts into which the reader divides a word may consist of syllables, which are the pronunciation units of the word, or of roots, prefixes, and suffixes, which are the meaning parts of a word. In both phonetic and structural analysis, the act of blending is necessary in order that the recognized sounds, combinations of sounds, or word parts may be combined into word wholes.

The test which forms the basis of this study does not attempt to measure all of the word analysis skills discussed in the preceding paragraphs. It does deal with auditory recognition and recall, visual recognition and recall, auditory recognition of syllables, and blending.

Research directly related to the importance of these skills and to attempts to test and to teach them in the secondary school is meager. On the other hand, research concerned with the testing and teaching of word analysis skills at the elementary school level has been considerable. It is important in the present study to know the results of the work done with the younger children since the teaching of reading in the secondary school is not a different problem; it is merely a more complicated extension of the same problem. Therefore, a selection has been made of what seem to be the more significant of the studies at the elementary level. These will be summarized, and the very small amount of evidence which is available on the secondary level will be discussed in more complete detail.

Two areas of research have been eliminated from consideration because they seem less directly connected with the present problem: the research relating to the testing and teaching of auditory and visual skills during

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the pre-reading or readiness stage; and the development of the various individually administered tests of word analysis skills. Discussion will be restricted to group tests and to experiments conducted above the reading readiness level.

The research will be reviewed under two major headings:

1. Findings concerning the relationship of word analysis abilities to performance in reading and spelling. This section will include the evidence from experiments in which these skills have been taught and in which the effect of the teaching upon success in reading and spelling has been measured.
2. Testing procedures which have been developed for measuring the auditory and visual skills.

Relationship of Certain Word Analysis Abilities to Performance in Reading and Spelling

General statements concerning the importance of word analysis skills are many. All are in substantial agreement. On the subject of phonetic analysis, Kottmeyer[1/] puts the point strongly when he says:

> There is little point here to review various arguments about whether we shall teach children phonics. No human being can become completely literate in the English language unless he can use such a body of skills.

Burkart[2/] made a very complete list of all the specific reading skills which she found listed in the professional literature. Her long list of 214 such skills was reduced to 89 with the help of five reading specialists to whom she submitted it for comment. Each item in the list

1/William Kottmeyer, "On the Relationship of Word Perception Skills in Reading and Spelling," Education, 72:600-603, May, 1952.

2/Kathryn H. Burkart, "An Analysis of Reading Abilities," Journal of Educational Research, 38:430-439, February, 1945.

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of 89 skills was then rated as (1) highly important, (2) important, or (3) unimportant, by 40 other specialists in reading. By a weighted percentages method she reduced the tabulation to a list in order of importance. The ratings given to the items in the list ranged from 1.90 to -.39. The following skills pertinent to the present study received the ratings indicated:

Skill	Rating
Ability to distinguish between similar appearing words	1.65
Ability to recognize familiar syllables and phonograms	1.39
Ability to discriminate sounds clearly	1.29
Ability to blend or fuse letter sounds or combinations	1.29
Ability to recognize familiar parts in word combinations	1.29
Ability to discriminate temporal sequence of sounds, i.e., to get sounds in right order	1.20
Ability to discriminate complex visual patterns	1.06
Ability to work out phonograms	.96
Ability to search for largest known whole (in a word)	.96
Ability to give sounds of individual letters	.95
Ability to give words with prescribed initial or final sounds	.71
Ability to give letters corresponding to letter sounds	.43

It is apparent that reading specialists consider some of these auditory and visual skills very important.

In one of the few articles devoted to the subject on the secondary level, McCullough[1/] discusses some practical suggestions for teaching word analysis. She points out that an occasional student is still "in the dark ages of word analysis."

He will not know the first thing about the sounds of consonants

1/Constance M. McCullough, "Word Analysis in the High School Program," English Journal, 41:15-23, January, 1952.

of 99 skills was then rated as (1) highly important, (2) important, or (3) unimportant, by 40 other specialists in reading. By a weighted percentage method she reduced the tabulation to a list in order of importance. The ratings given to the items in the list ranged from 1.00 to -.32. The following skills pertinent to the present study received the ratings indicated:

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Ability to distinguish between similar appearing words	1.65
Ability to recognize familiar syllables and phonograms	1.39
Ability to discriminate sounds clearly	1.34
Ability to blend or fuse letter sounds or combinations	1.29
Ability to recognize familiar parts in word combinations	1.29
Ability to discriminate temporal sequence of sounds, i.e., to get sounds in right order	1.20
Ability to discriminate complex visual patterns	1.06
Ability to work out phonograms	.96
Ability to search for largest known whole (in a word)	.96
Ability to give sounds of individual letters	.95
Ability to give words with prescribed initial or final sounds	.71
Ability to give letters corresponding to letter sounds	.43

It is apparent that reading specialists consider some of these auditory and visual skills very important.

In one of the few articles devoted to the subject on the secondary level, McCullough[1] discusses some practical suggestions for teaching word analysis. She points out that an occasional student is still "in the dark ages of word analysis."

He will not know the first thing about the sounds of consonants

[1] Constance M. McCullough, "Word Analysis in the High School Program," English Journal, 41:15-23, January, 1952.

or of vowels. The approach to him must be the same as for any beginner. His ear must first be trained to hear the sound of the vowel or consonant in words that feature it.

....A compound word must fall into two parts before their (the students') analytical eyes. A polysyllabic word must clearly present to them its prefix, root, and suffix, as though they were cars in a railroad train. Having separated the parts for analysis of sound and meaning, the students must then reassemble them in meaning and sound to compose the total word.

....Some students will have been afflicted with measles, transfer from school to school, immaturity, or better things to think about, when they were supposed to be learning certain basic facts about words in the elementary school. When you talk about syllables, they have never heard of them. When you explain that each syllable contains a sounded vowel, they wonder what vowels are. When you explain why one vowel is long when another is short, they see no difference in the size of type. You just brace yourself and make the best of it.1/

Thus, McCullough expresses not only the need for word analysis training in high school but also something of the frustration which many high school teachers feel when they are faced with the problem of teaching these basic skills.

Evidence from Studies of Retarded Children

Much of the evidence concerning the importance of these skills has come from study of the difficulties of pupils who are retarded in reading and spelling. The evidence has accumulated over a long period of time. In 1922, Gates,2/ examining the psychology of reading and spelling, found that the quality of word perception, as measured by the tests which he administered, is significantly related to both reading and spelling. Two of his conclusions concerning spelling are as follows:

The most common cause of misspelling is to be found in inadequacy of acquaintance with the visual form of the word.

1/Ibid., pp. 19-20

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Inability to make an analytical attack upon unfamiliar words is typical of the poor speller.1/

Very interesting evidence of the importance of visual perception was brought out by Gates and Chase 2/ in their study of the spelling of deaf children. They found deaf children considerably superior to hearing children when the two groups were equated on the basis of reading ability. They attributed the greater spelling efficiency of the deaf to "extraordinary word-perception ability." They found the deaf considerably superior to hearing children on several tests of visual perception and conclude:

> Normal children, despite wider opportunities in reading and writing, do not seem to acquire as effective a type of word-perception. The hypothesis here offered is that normal children fail to develop this precise, accurate and -- as far as the effects on spelling are concerned -- effective form of word observation because they rely mainly on the easier, perhaps more natural -- yet for spelling less productive -- device of phonetic translation.3/

A later study by Templin 4/ conducted with a larger population of deaf children confirmed the findings of Gates and Chase, though the conclusions are tempered somewhat. Templin points out that spelling receives a greater emphasis in the training of the deaf and that, on the whole, deaf children may be expected to excel in a concrete, drill type of skill.

1/Ibid., p. 86.

2/Arthur I. Gates and Esther H. Chase, "Methods and Theories of Learning to Spell Tested by Studies of Deaf Children," Journal of Educational Psychology, 17:289-300, May, 1926.

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Bond[1] and Fendrick,[2] in companion studies of the visual and auditory characteristics of poor readers in grades two and three, found evidence that good readers possess powers of both visual and auditory perception which are lacking in the poor readers. Fendrick states that the mean performance on all his tests of visual perception was consistently better for his control group (good readers), and he concludes that the perceptual factor may be used to facilitate the segregation of potentially poor readers. Bond similarly found differences between the good and poor readers in blending and auditory perception techniques.

Some of the children whom Bond and Fendrick tested had received considerable phonetic training; others had been taught to read by the look-and-say method. Both authors comment that the importance of the auditory and visual skills is in relation to the type of teaching to which the pupils are being submitted.

Monroe,[3] in her study of children at the Institute for Juvenile Research, found evidence among the very poor readers of lack of precision in auditory discrimination and also in ability to retain the temporal sequence of sounds, a skill necessary in blending. She comments:

> A child must be able to differentiate the sequence of sounds as well as the spatial pattern of letters in vision before he can develop a phonetic system by which he can read strange or unfamiliar words.[4]

1/Guy L. Bond, The Auditory and Speech Characteristics of Poor Readers, Teachers College, Columbia University, Contributions to Education, No. 657. New York: Bureau of Publications, Teachers College, Columbia University, 1935.

2/Paul Fendrick, Visual Characteristics of Poor Readers, Teachers College, Columbia University, Contributions to Education, No. 656. New York: Bureau of Publications, Teachers College, Columbia University, 1935.

3/Marion Monroe, Children Who Cannot Read. Chicago: The University of Chicago Press, 1932.

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Russell,[1] in a diagnostic study of good and poor spellers in the intermediate grades, found significant differences between the two groups in auditory discrimination of words differing slightly in sound. He also found the good spellers consistently better in a series of language activities which includes a knowledge of letters and their sounds, ability to combine these in syllables and words, ability to analyze separate letters out of syllables, ability to see similarities and differences in words, and ability to pronounce words.

Durrell, Sullivan, and Murphy,[2] drawing conclusions based on the individual analysis of more than four thousand children who had had difficulty in learning to read, list the causes of failure in the order of frequency. The first two causes in this list are:

> 1. Lack of auditory discrimination of word elements. Children with excellent speaking vocabularies often fail to notice (hear) the basic sounds in words.
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> 2. Lack of visual discrimination of differences between words. Children confuse words and letters which look somewhat alike; they fail to notice (see) the forms of words.[3]

Robinson,[4] in discussing six major types of word perception problems observed among pupils in the reading clinic at the University of Chicago,

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1/David H. Russell, Characteristics of Good and Poor Spellers: a Diagnostic Study, Teachers College, Columbia University, Contributions to Education, No. 727. New York: Bureau of Publications, Teachers College, Columbia University, 1937.

2/Donald D. Durrell, Helen Blair Sullivan, and Helen A. Murphy, Building Word Power. Yonkers-on-Hudson, New York: World Book Company, 1945.

3/Ibid., p. 1.

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makes the following statement:

> The first type is characterized by lack of visual efficiency and by faulty visual perception. Such children find it difficult or impossible to distinguish between likenesses and differences in pictures, forms, and words. They may show total inability to learn enough words to read even at the primer level; or they may learn words that are dissimilar in general appearance but exhibit major confusion when encountering words that resemble each other.1/

Some of these children have visual defects; in others, the vision specialist can find no measurable evidence of difficulty.

Robinson continues:

> The second type of inefficient word-perceiver exhibits difficulty in auditory perception. Such children do not properly distinguish the sounds of the spoken word, and, as a result, they frequently exhibit speech defects. Typically, they miscall words with similar sounds, both in speech and in reading. Younger learners exhibit these inaccuracies in smaller words while more mature students may mispronounce polysyllabic words.2/

Again, the problem may not be connected with any physical loss of hearing.

In a study of one hundred poor readers in the ninth grade Witty 3/ found 32 per cent lacking in the ability to attack new words. Sixty-one per cent of the group had a slow rate in silent reading and 56 per cent were deficient in vocabulary. Witty does not point out any connections among these deficiencies, but it is obvious that inability to "figure out" any considerable number of words would not only prevent understanding of the words but also slow the rate of reading.

Spache 4/ states the problem as follows:

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2/Ibid., p. 123.

3/Paul Witty, "Reading Retardation in Secondary Schools," Journal of Experimental Education, 15:314-317, June, 1947.

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> If I may judge from my own clinical experiences and those reported for St. Louis by Kottmeyer, lack of skill in methods of word recognition and word attack is the most common deficiency in the reading of retarded readers. Poor readers of all ages seem to be unfamiliar with phonic or structural analysis, use of context, or any of the other means of discovering the pronunciation and meaning of unknown words. It is true that some individuals learn to read surprisingly well without much skill in word analysis. But the utter lack of any method other than sheer guessing, so often characteristic of retarded readers, is a severe handicap to reading progress.1/

Studies Comparing Importance of Different Word Analysis Skills

In planning a teaching program, it is obviously necessary to know which of the various skills are most important to success in reading and spelling. Two recent studies have provided evidence. Harrington 2/ administered an intelligence test, an auditory discrimination test, a visual discrimination test, an individual oral test of phonetic ability, and two informal reading tests to 500 children in second grades. Using a pairing technique, supplemented by partial correlation analysis, Harrington held three of the following variables constant while the fourth was being compared with reading achievement: mental age, auditory discrimination, visual discrimination, and phonetic ability. She found visual discrimination most closely associated with reading ability. Phonetic ability, by which she means the ability to produce the sounds of letters and blends when presented with the visual symbols, is second in importance. Auditory discrimination also has a significant relationship with success in reading. Harrington found only a very slight positive relationship between mental age and reading achievement at the second grade level.

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Mack[1] carried out a very similar study with 453 fifth grade pupils. She extended the study to include spelling. She found all four of the factors related to reading ability in the following order of importance: mental age, phonics, visual discrimination, and auditory discrimination. She theorizes upon the difference between the order of importance of the factors in her study as compared with the Harrington study:

> Phonetic ability appears to be based on intelligent application of both auditory and visual discrimination. Therefore, it would seem that this skill becomes increasingly important in higher levels of reading, as this study has shown. Ability in the individual skills of auditory and visual discrimination seems to be more necessary in the primary grades where reading is on a less independent basis and where phonetic analysis has been separated into the definite areas of visual and auditory teaching.[2]

Mack also found phonetic ability and visual discrimination to have a high positive relationship with success in spelling. There was a low positive relationship between mental age and spelling but no significant positive relationship between spelling and auditory discrimination. Although both Harrington and Mack use the terms auditory discrimination and visual discrimination, the skills they measure belong to the somewhat more advanced level of ability called auditory and visual recognition by the present writer.

It should be noted in connection with the Mack study as compared with the Harrington study that the test of phonetic ability used by Mack required blending as well as knowledge of separate sounds. In her test the children were given an individual test which required pronunciation of nonsense syllables and words.

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Studies of Correlation of Word Analysis Abilities with Reading and Spelling

Statistical studies of the relationship of various word analysis abilities to performance in reading and spelling have been numerous. A tabulation made from a few representative studies is presented in Table I in order to show the trend in these relationships. Samples are taken from different grade levels.

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TABLE I

SAMPLES OF CORRELATIONS OBTAINED IN PREVIOUS RESEARCH SHOWING RELATIONSHIP OF CERTAIN AUDITORY AND VISUAL SKILLS TO PERFORMANCE IN READING AND SPELLING

Author	N	Grade	r	Variables
				Reading:
Harrington 1/	500	2	.544	- Auditory recognition of word parts
Harrington	500	2	.637	- Visual recognition of letters and words
Barry 2/	213	2	.52	- Auditory recognition of word parts
Bourke 3/	188	2	.553	- Visual recognition of letters and words
Acomb 4/	380	3-6	.70	- Visual recognition of whole words
Acomb	380	3-6	.71	- Auditory recognition of whole words
Petit 5/	170	4-6	.64	- Auditory recognition of word parts
Herbert 6/	113	6-8	.52	- Visual recognition of whole words
Tiffin 7/	155	5-8	.70	- Phonetic ability
Rogers 8/	179	Coll.Fr.	.69	- Phonetic ability

(Concluded on next page)

1/Harrington, op. cit.

2/Florence M. Barry, and others, Analysis of Auditory Functions in Grades One, Two, and Three. Unpublished Master's Thesis, Boston University School of Education, Boston, 1951.

3/Anne J. Bourke, and others, The Relationship of Certain Word Analysis Abilities to the Reading Achievement of First, Second, and Third Grade Children. Unpublished Master's Thesis, Boston University School of Education, Boston, 1953.

4/Allen Acomb, A Study of the Psychological Factors in Reading and Spelling. Unpublished Master's Thesis, Boston University School of Education, Boston, 1936.

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Nichols 1/	436	3	.59	- Visual perception (combined recognition and recall)
Nichols	436	3	.63	- Auditory perception (combined recognition and recall)
Acomb	380	3-6	.76	- Visual recognition of whole words
Acomb	380	3-6	.72	- Auditory recognition of whole words
Carter 2/	180	5,6	.6385	- Visual recall of whole words
Carter	180	5,6	.5725	- Auditory recall of whole words
Brooke 3/	180	4-6	.654	- Visual recall of nonsense words and syllables
Brooke	180	4-6	.668	- Auditory recall of nonsense words and syllables
				Word Pronunciation:
Mack 4/	453	5	.6536	- Phonetic ability
Mack	453	5	.5412	- Auditory recognition of word parts
Mack	453	5	.5612	- Visual recognition of word parts
Rogers	80	Coll.Fr.	.62	- Phonetic ability

1/Augusta Matilda Nichols, The Construction and Use of a Group Test for the Analysis of Spelling Difficulties. Unpublished Doctor's Thesis, Boston University School of Education, Boston, 1947.

2/Bernadetta R. Carter, The Construction of Tests of Visual Perception, Auditory Discrimination, and Kinaesthetic Factors to Be Used in Diagnosing Inadequate Performance in Spelling. Unpublished Master's Thesis, Boston University School of Education, Boston, 1941.

3/Barbara Ann Brooke, Comparison of Recognition and Recall of Word Elements as Methods of Measuring Visual and Auditory Perception in Spelling. Unpublished Master's Thesis, Boston University School of Education, Boston, 1947.

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Mack	453	5	.5412	- Auditory recognition of word parts
Mack	453	5	.5612	- Visual recognition of word parts
Rogers	80	Coll.Fr.	.62	- Phonetic ability

1/Augusta Matilda Nichols, The Construction and Use of a Group Test for the Analysis of Spelling Difficulties. Unpublished Doctor's Thesis, Boston University School of Education, Boston, 1947.

2/Fernadetta R. Carter, The Construction of Tests of Visual Perception, Auditory Discrimination, and Kinaesthetic Factors to Be Used in Diagnosing Inadequate Performance in Spelling. Unpublished Master's Thesis, Boston University School of Education, Boston, 1941.

3/Barbara Ann Brooks, Comparison of Recognition and Recall of Word Elements as Methods of Measuring Visual and Auditory Perception in Spelling. Unpublished Master's Thesis, Boston University School of Education, Boston, 1947.

4/Mack, op. cit.

Many of the coefficients of correlation reported in Table I indicate a considerable degree of relationship. It does not necessarily follow, of course, that training in the skills will produce improvement in reading and spelling. However, several studies have indicated strongly that such improvement does take place, at least in the case of pupils in the elementary school.

Results of Teaching Auditory and Visual Skills

Murphy and Junkins[1] administered tests of learning rate and of visual and auditory discrimination to three groups of fifty children each in the first grade. Thirty auditory lessons were given to one group and thirty visual lessons to another. The third group served as a control. After six weeks all three groups were retested. Both experimental groups had doubled their power to retain words taught whereas the control group had improved only slightly. Three months later, the experimental groups had statistically superior scores as compared with the control group on the Detroit Word Recognition Test.

Murphy[2] later did a more detailed study of the effect of training in auditory and visual discrimination on four groups of first grade children. One group received both auditory and visual training; the second, just auditory training; the third, just visual training. The fourth group served as a control. All experimental groups were significantly superior to the control group in reading achievement at three successive testing

1/Helen A. Murphy and Kathryn M. Junkins, "Increasing the Rate of Learning in First Grade Reading," Education, 62:37-39, September, 1941.

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Nugent [1/] studied the effectiveness of a program in word analysis on reading and spelling in two second grades. The two groups were fairly well equated in chronological and mental age. Both grades were given the Nason phonics test [2/] at the beginning of the experiment and a similar but harder test at the end. The experimental group received special word analysis exercises for 50 days. At the end of the experiment the pupils were tested in phonics, reading, and spelling. The experimental group was found to be superior to the control group in reading: critical ratio, 5.06. The experimental group was also superior in spelling: critical ratio, 8.94. The spelling test contained words made up of word elements which had been presented in the word analysis exercises.

Hoffman [3/] used auditory perception exercises in 11 third grades. She found highly significant gains in performance on a test of varied auditory skills which she constructed as a part of her study. She found the mean score always lower for boys than for girls, but the boys' response to teaching was, by comparison, greater than the girls'.

1/Esther M. Nugent, An Evaluation of an Intensive Program in Word Analysis on Spelling and Reading in Second Grade. Unpublished Master's Thesis, Boston University School of Education, Boston, 1950.

2/Doris Elnora Nason, The Influence of Vocabulary Common to Test and Textbook on Primary Reading Test Scores. Unpublished Doctor's Thesis, Boston University School of Education, Boston, 1951.

3/Mary W. Hoffman, An Evaluation of Exercises to Increase Auditory Discrimination in the Third Grade. Unpublished Master's Thesis, Boston University School of Education, Boston, 1951.

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Barden[1] similarly evaluated the effectiveness of auditory and visual training in the third and fourth grade. She found significant gains in both auditory recall and visual recognition tests after a six-week period of teaching. No tests of reading or spelling were given.

Browne[2] experimented with 320 pupils in grade six. Each pupil took an individual test of phonetically spelled nonsense words. Reading and intelligence tests were used to equate the control and experimental groups. Phonics drills were given only in the experimental groups. The findings indicate that carefully planned phonics lessons do improve reading of sixth grade pupils and that children with low intelligence are as likely to profit as those with higher intelligence. Browne points out that the study of phonics stimulated the better pupils in this sixth grade group to even further growth.

Smith[3] experimented with the effect of auditory perception exercises on the spelling of 23 pupils in grade seven. Two small groups of pupils were used, one group serving as a control. Twenty lessons produced significant improvement in the spelling of the experimental group as compared with that of the control group.

1/Mary Corinne Barden, The Construction and Evaluation of Exercises for Specific Training in Auditory and Visual Discrimination in Third and Fourth Grades. Unpublished Master's Thesis, Boston University School of Education, Boston, 1945.

2/Sister M. Dorothy Browne, O.P., Phonics as a Basis for Improvement in Reading. Washington, D. C.: The Catholic University of America, 1939.

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Hudson and Toler[1] conducted a much more extensive spelling study involving 297 pupils in grades 4, 5, and 6. The materials in Building Word Power[2] and Ready to Read[3] were used for teaching auditory and visual discrimination. Findings showed a gain of 85.2 per cent over the initial spelling test given before training started. They conclude that greater stress should be placed on the association of the auditory and visual patterns which make up words.

Rogers,[4] working with freshmen at the University of Iowa, gave individualized training in phonetic principles to students who were poor readers. An average of 16 conferences were held with each student. At the end of the experiment, retests were given of phonic ability, vocabulary, paragraph reading, spelling, pronunciation, and oral reading. Significant gains were made in all but the paragraph comprehension and spelling tests. On the vocabulary section of the Nelson-Denny Reading Test, the gain was 53 per cent over the original scores. On the average, a 50 per cent gain over original scores was made in oral reading. Gains in pronunciation average 70 per cent. Rogers summarizes as follows:

> These large improvements seem to validate the use of phonics instruction at the college level, for poor readers can make use of these principles in actual pronunciation. It must be remembered that these improvements are not due to specific coaching on the words in the test....The improvement in pronunciation came largely due to the ability to connect visual symbols with known auditory symbols.[5]

1/Jess S. Hudson and Lola Toler, "Instruction in Auditory and Visual Discrimination as Means of Improving Spelling," Elementary School Journal, 49:466-469, April, 1949.

2/Durrell, Sullivan, and Murphy, op. cit.

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The studies cited in the foregoing discussion seem to indicate two things quite conclusively:

1. When pupils are given special training in the word analysis skills, they improve rapidly in the skills selected for teaching.
2. When pupils are given this special training, they also improve in reading and spelling ability.

Procedures for Testing Word Analysis Skills

Several reading readiness tests and individually administered inventories containing tests of auditory and visual skills have been standardized. Otherwise, most of the measures of word analysis abilities are unstandardized and, for the most part, unpublished. Detailed study of the various tests reveals that the same general types have been used repeatedly with minor variations. In the ensuing paragraphs, the main types will be described with reference to studies in which examples of their use at various grade levels may be found.

Visual Tests

Type 1: Recognition of real words or parts of words - flash technique

In this type of test words are presented, usually on flash-cards, and pupils select the word which has been flashed from

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Type 2: Visual recall - writing from memory real words or parts of words - flash technique

Words or parts of words are exposed for very brief periods and the pupil writes from memory what he has seen. In some cases, delayed recall is tested by asking the pupil to wait for a certain length of time before writing the word. This

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5/Nichols, op. cit.

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is a type of test used by Carter,[1] Barrett,[2] Conway,[3] and Nichols.[4] Brooke[5] used nonsense words. The test is most frequently used in grades three and above.

Besides these two most frequent types of visual tests, others appear in some of the studies. Among these less common forms are the following:

Type 3: Finding spelling errors in context

This kind of test was used by Nichols,[6] whose study is one of the more extensive test construction projects of this sort.

Type 4: Visual discrimination

Pupils are asked to find the word or phrase which matches a stimulus word or phrase. There is no special emphasis on speed as in the tests done with flashcards. This type of test is used by Gates.[7]

Auditory Tests

In the case of group tests of auditory skills, one or more of three types have been used in a majority of the studies.

Type 1: Recognition of whole words or phrases read or spoken to pupils

Pupils select from among the distractors in a multiple-choice

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2/Patricia Barrett, and others, The Relation of Perceptual Factors and Speed of Handwriting to Spelling Ability. Unpublished Master's Thesis, Boston University School of Education, Boston, 1951.

3/Virginia Conway and others, A Study of Factors Related to Primary Grade Spelling. Unpublished Master's Thesis, Boston University School of Education, Boston, 1951.

4/Nichols, op. cit.

5/Brooke, op. cit.

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item the word spoken to them by the examiner. This type of test was used by Hill,[1] Barrett,[2] and Larkin and Mitchell.[3]

Type 2: Auditory recall - writing words pronounced by the examiner

This type of test actually involves the process of spelling from sound. In most cases, words are chosen which are phonetically spelled but unfamiliar to the pupils. In this way the test is made a measure of auditory recall rather than of knowledge of spelling. Carter,[4] Barrett,[5] Conway,[6] and Nichols[7] have used this type of test. A variation of this test, used by Barden,[8] involves writing a designated part of the stimulus word.

Type 3: Recognition of sounds within a word

The test consists of multiple-choice items in which the visual symbols for certain sounds are given. Pupils listen to a stimulus word and circle the visual symbols of sounds which they hear within the word. This test varies all the way from a very simple type involving only initial sounds to a very

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Measures of pure auditory and visual discrimination seem to appear mostly in the reading readiness tests and in individually administered batteries such as those of Gates[7] and Monroe.[8] So far as the writer has been able to determine, the only tests of blending are individual tests

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3/Nason, op. cit.

4/Eleanor Maskell, The Construction and Evaluation of a Group Auditory Test of Word Analysis for Grade One. Unpublished Master's Thesis, Boston University School of Education, Boston, 1950.

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Four of the tests used in the present study are adaptations for older pupils of four of the most frequently used tests described in the preceding paragraphs: Visual tests, types 1 and 2, and auditory tests, types 2 and 3. The blending test used in this study seems to have no close counterpart in any previous study. The test of auditory recognition of syllables was found only in the Rogers[1/] study.

Other Related Research

Because of their more direct connection with the problem of this thesis, a few studies have been set aside for more complete review in the concluding pages of this Chapter.

Hartmann[2/] administered a fifty-word spelling test to 636 college students, freshmen to seniors. From the results, he selected the 24 best spellers, 21 average spellers, and 18 of the poorest. To these 63 students he administered the following group tests:

Test 1 - Perceptual span of meaningful material
Words such as ageratum, cleisterogamous, etc., were exposed with a tachistoscope for one second each. Students then wrote what they had seen. Total number of completely correct reproductions was the score.

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Test 2 - Visual recognition
Twenty common words were exposed on cards to subjects, about one per second. They were then mixed with 20 other words. Subject was asked to pick out the words he had seen.

Test 3 - Silent reading - Whipple's High School and College Reading Test

Test 4 - Hidden word identification
Subjects underlined meaningful English words which were hidden in a jumbled nonsense collection on a page. Two minute time limit.

Test 5 - Letter-digit substitution code
Time of transcription was the score, measured in seconds.

Test 6 - Auditory memory span for digits
The fourteen number sets from the corresponding section of Whipple's manual were read to the subject in time with a metronome and recorded by him as heard. Averaging the highest correct reproduction in both sets gave the desired measure of span.

Test 7 - Pronunciation
The 32 words in the pronunciation section of the Cross English Test were used. The printed list was shown the subject with instructions to pronounce each word as though he were being graded for purity of speech by a language teacher. The experimenter checked the correct items by listening carefully as the subject proceeded.

Test 8 - Auditory recognition
A list of ten ordinary words was read at an even rate to the subject with instructions to fixate them. Immediately after this list had been read, a longer list of 20 words containing the ten originals plus ten confusion stimuli was offered. As each word in the test list was uttered, the subject said "yes" or "no."

Only the first test proved to have discriminatory power between the superior group of spellers and the average and between the average and the inferior. Hartmanncomments:

> Apparently Test 1 of the visual group is the only one which can be used to segregate the various classes of spelling talent. This test contains a group of rare words which the subject copies from immediate memory as soon as they have been exposed. According to the evidence which this affords, speed and accuracy of immediate

Test 2 - Visual recognition
Twenty common words were exposed on cards to subjects, about one per second. They were then mixed with 20 other words. Subject was asked to pick out the words he had seen.

Test 3 - Silent reading - Whipple's High School and College Reading Test

Test 4 - Hidden word identification
Subjects underlined meaningful English words which were hidden in a jumbled nonsense collection on a page. Two minute time limit.

Test 5 - Letter-digit substitution code
Time of transcription was the score, measured in seconds.

Test 6 - Auditory memory span for digits
The fourteen number sets from the corresponding section of Whipple's manual were read to the subject in time with a metronome and recorded by him as heard. Averaging the highest correct reproduction in both sets gave the desired measure of span.

Test 7 - Pronunciation
The 32 words in the pronunciation section of the Cross English Test were used. The printed list was shown the subject with instructions to pronounce each word as though he were being graded for purity of speech by a language teacher. The experimenter checked the correct items by listening carefully as the subject proceeded.

Test 8 - Auditory recognition
A list of ten ordinary words was read at an even rate to the subject with instructions to fixate them. Immediately after this list had been read, a longer list of 20 words containing the ten originals plus ten confusion stimuli was offered. As each word in the test list was uttered, the subject said "yes" or "no."

Only the first test proved to have discriminatory power between the superior group of spellers and the average and between the average and the inferior. Hartman comments:

Apparently Test 1 of the visual group is the only one which can be used to segregate the various classes of spelling talent. This test contains a group of rare words which the subject copies from immediate memory as soon as they have been exposed. According to the evidence which this affords, speed and accuracy of immediate

visual perception exert the dominant influence in spelling proficiency.1/

Hartmann felt that "the major outcome of this investigation is that spelling ability is largely dependent on one special form of visual reaction and not upon general superiority in any sense modality or upon a common integrative capacity."2/

Herbert 3/ constructed a word perception test to discover with what degree of accuracy pupils in the upper grades perceive individual words at different speeds of exposure, whether there are significant differences in ability to perceive individual words between these grades, and whether there is a relationship between ability in word perception and general reading achievement. His visual recognition test was a multiple-choice test. Words were flashed by means of a quick-flash device calibrated for four speeds. The stimulus words ranged in difficulty from three-letter words to words found only in the vocabulary of a superior adult. The New Stanford Reading Test was administered.

The 125 pupils in Herbert's study were from grades 6, 7 and 8. There were two 6th grade groups, one 7th, and one 8th. One sixth grade group consisted of slow learners. The others are described by the author as "the best students in the sixth, seventh, and eighth grades respectively." These facts suggest that his results may not be reliable for an unselected population.

Results of Herbert's experiment indicate little growth in perceptual ability from grade six through grade eight. All divisions did relatively

1/Ibid., p. 696.

2/Ibid., p. 699.

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1\Ibid., p. 275.

2\Ibid., p. 599.

3\Herbert, op. cit.

well at exposure speeds up to .16 second; between .16 second and .03 second there was a sharp decline in performance. The correlation between reading ability as measured by the New Stanford Test and perception of individual words was .52.

A test of phonic ability by Maurine Rogers [1/] consists of two parts. In Part I, pupils are given a list of 140 words, most of them nonsense words, which they are asked to break into syllables by visual inspection. Examples of the items are:

Item 61. cymtur Item 100. gheej Item 140. analogy

In Part II, the pupils are presented with multiple-choice items from which they are asked to select the most likely pronunciations for a series of nonsense words. Diacritical marks used in the test are explained in the directions. Sample items follow:

Item 32. wrogg 1. wuräg 2. wurōg 3. räg 4. wäg

Item 81. bajkile 1. bajkīlu 2. bajkulē 3. bajkīl 4. bajkul

Item 90. hien 1. hiun 2. hīēn 3. hīn 4. hēn

Each item in Part II is included for the purpose of measuring one particular phonetic principle. For example, the first item, 'histen', was designed to measure the student's knowledge of the fact that the t in words ending in 'sten' is silent. The third item, 'pnum,' determines whether or not a student knows that p before n in the same syllable is silent.

The author reports a reliability of .94 for Part I and of .88 for Part II for the test. The correlation of Part II with the Iowa Silent Reading Test is reported as .69; of Part I, as .40. Further comment on the validity of the test is best given in the author's words:

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Part II also correlates highly with mispronunciation (on the vocabulary section of the Nelson-Denny Reading Test). These correlations might have been even higher if a wider range of ability could have been included. Pronunciation records were available, however, on only the poor readers who had been in the reading clinic. The fact that the test correlates more highly with the Iowa Silent Reading Test and the number of mispronunciations than it does with Mathematical Aptitude shows that it is not a measure of general ability but is more specifically a measure of one aspect of reading ability. One might ask why a measure of phonic ability would be necessary if it correlates as high as .70 with general reading ability. Justification can be made, however, by analogy. The coefficients of correlation between reading and intelligence tests are sometimes this high but one does not use intelligence tests as an index to reading ability. The correlation between phonic ability and general reading ability is not so high but that there are some cases who are poor readers but rate high in the mechanics of reading. These cases should not be given training in phonics. The fairly low inter-part but high part-whole correlations meet one of the criteria of the validity. They show that Part I and Part II do not measure the same functions.1/

So far as the writer could determine, the Rogers test has been used in just one experimental situation other than that in which it was originally developed. Tiffin and McKinnis 2/ made use of Part II of the test in an experimental study with pupils in grades 5, 6, 7, and 8. The authors of the study felt that the diacritical marks used in the original test, while they might be suitable for college students, were not useful for testing younger pupils. They wanted a measure of phonic ability and not of skill in the translation of diacritical markings. Therefore, they presented each nonsense word separately to each child who responded orally by pronouncing the word. The reliability of the Individual Phonic Test, thus used, was .94. Tiffin and McKinnis found the following relationships with other tests which the same group of 155 pupils took:

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Iowa Silent Reading Test	(Comprehension)	.66
Iowa Silent Reading Test	(Rate)	.55
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The authors conclude that phonetic ability is significantly related to reading achievement among pupils in this experiment. They found a slight increase in the mean score on the phonics test between grades 5 and 8, but the variability within each grade was very great. They conclude:

> It is also felt that the Individual Phonic Test may be used as one element in a battery of diagnostic tests to determine whether a retarded reader is deficient in this particular respect. It seems highly probable that cases found to be markedly deficient in phonic ability and not markedly deficient in other important characteristics may be profitably treated by instruction and drill in the specific principles of phonics.1/

Triggs 2/ includes a discussion of the Rogers test in the appendix of her book on remedial reading. She mentions that the test has been revised and that Part II has become an individual test as it was in the Tiffin and McKinnis experiment. Correlations are given to show the relationship of the test in the revised form to various other tests used in the University of Minnesota reading clinic. Correlations are almost universally low except with the Cooperative English Test where correlations of Part II with usage, spelling and vocabulary are .70, .50, and .62 respectively. All correlations with reading are low except with the Iowa Silent Reading Test: Use of the Index, with which the correlation is .49. Triggs concludes that "these correlations would tend to justify the present use of phonics as a remedial technique in cases of spelling disability in the University of

1/Ibid., p. 192.

2/Frances Oralind Triggs, Remedial Reading: The Diagnosis and Correction of Reading Difficulties at the College Level. Minneapolis: University of Minnesota Press, 1943.

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The most recent attempt to build a group test of phonetic abilities for older students, grades 7 - 13, was made by the Committee on Diagnostic Reading Tests of which Frances Triggs is chairman. This test has been published as Higher Level, Section IV: Word Attack, Part 2, Silent, of the battery of Diagnostic Reading Tests.[2] It tests ability to hear and match sounds and to divide words into syllables. Part I of the test consists of two series of items. In the first series, each item has as its key a very familiar word. This word is followed by five other words, also familiar. The student notes the underlined letter or letters in the key word, thinks of the sound, and underlines all the words in the list of five which contain the same sound. For example:

Item 4. steak 1. lake 2. meat 3. learn 4. head

In the second series of items in Part I, the pupil is asked to locate those words which contain silent consonants. For example:

Item 67. 1. quiet 2. debtor 3. castle 4. quartz ( )

Part II of this test again uses familiar words. The right response is the number of syllables in the word without regard for exact division. For example:

Item 77. reward ( )

Item 118. crucifixion ( )

Triggs[3] has commented on the use of the test. In testing students

1/Ibid., p. 200.

2/Published by the Committee on Diagnostic Reading Tests, Inc., Kingscote Apt., 3G, 419 West 119th Street, New York 27, 1947.

3/Frances Oralind Triggs, "The Development of Measured Word Recognition Skills, Grade Four Through the College Freshman Year," Educational and Psychological Measurement, Vol. 12, No. 3:345-349, Autumn, 1952.

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> The last word has not been said on any of this by all means. Are there those persons who are excellent readers without these two measured skills? Are there those persons who cannot learn these skills, but can learn others which may be used as substitutes? And to what extent is the test used measuring a primary mental ability and thus not really indicative of skills to be acquired through instruction? Much theoretical research must be done before these questions are answered. Until it is done, it would seem well to encourage instruction in these areas in the fourth grade through college freshman years in order that the skills be attained and transferred to aid in the development of reading and writing skills.

Recently the Lower Level (Grades 4 - 6) form of the Diagnostic Reading Tests 1/ has been published. This includes Booklet I, Part 1, Word Recognition and Comprehension. According to the Directions for Administering accompanying this test:

> The word recognition score is obtained from questions measuring ability to recognize and sound prefixes and suffixes and to determine how they modify the meaning of the root of the word of which they are a part; to recognize and match vowel and consonant combinations and to use these in saying a new word and in determining its meaning.2/

The test is unique in the writer's experience in that the items measuring these word recognition skills appear in the same sequence with questions of comprehension. For example, question 7 in the first section of the test:

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2/Diagnostic Reading Tests: Lower Level, Directions for Administering (mimeographed), p. 1.

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7. Which word or words helps you to say the c in certain?

(1) city ..... ( )
(2) curtain..... ( )
(3) cattle..... ( )
(4) celery..... ( )
(5) bicycle..... ( )

The word certain appears in the preceding paragraphs upon which the comprehension questions are based, but it is not a key word.

Statistical data on both levels of the Diagnostic Tests are still being accumulated. The tests represent pioneer efforts to standardize instruments of this sort.

Summary

An examination of the research shows the following to be true:

1. There is general agreement among authorities of the importance of the word analysis skills to success in reading and spelling.
2. A number of studies have shown a fairly high degree of relationship between performance on tests of various visual and auditory skills and tests of reading and spelling.
3. The word analysis skills can be successfully taught and improvement in the skills frequently results in accompanying improvement in reading and spelling.
4. A variety of types of group tests have been constructed for testing these skills. Examination reveals certain basic types of tests which have been used repeatedly with minor variations.
5. Nearly all of the studies have been conducted with pupils in grades one through six. Only one test of word analysis skills suitable for use in the high school has been published in readily available form.

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CHAPTER III

PRELIMINARY STUDY

The purpose of the preliminary study was to construct and try out on a small population a variety of short tests in order to obtain some evidence upon which to rely in building the instrument to be used in the main study. Accordingly, 21 such tests were constructed and administered to a group of 74 pupils in a seventh grade.

Test Construction

The tests were intended to measure the following skills:

1. Auditory recognition of initial consonants: Test I, Part A
2. Auditory recognition of initial blends: Test I, Part B
3. Auditory recognition of final consonants: Test I, Part C
4. Auditory recognition of final blends: Test I, Part D
5. Auditory recognition of medial consonants: Test I, Part E
6. Auditory recognition of sounds in any position in a word: Test I, Part F
7. Auditory recognition of short vowel sounds: Test I, Part G
8. Auditory recognition of initial syllables: Test I, Part H
9. Auditory recognition of final syllables: Test I, Part I
10. Auditory recognition of whole words: Test I, Part J
11. Ability to blend a series of sounds presented orally: Test II, Part A
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10. Auditory recognition of whole words: Test I, Part J
11. Ability to blend a series of sounds presented orally: Test II, Part A
12. Ability to blend a series of sounds presented visually: Test II,

Part B

13. Ability to determine the number of syllables in a word presented orally: Test III

14. Ability to determine the number of syllables in a word presented visually: Test IV

15. Ability to spell from sound: Test V

16, 17, 18. Ability to recognize words presented by means of a tachistoscope set at different speeds: Test VI, Parts A, B, C

19, 20, 21. Ability to recall words presented by means of a tachistoscope set at different speeds: Test VI, Parts D, E, F

Most of the stimulus words used in the auditory part of the test were selected from Webster's New International Dictionary[1/] and checked in the Thorndike Teacher's Word Book.[2/] A word which does not appear on the Thorndike list, Part I, does not occur even once per 1,000,000 words. A word not appearing in Part II of the Thorndike list does not occur even once per 4,000,000 words. It was thought that stimulus words should be used in most parts of the test which do not appear in the Thorndike list since very unfamiliar stimulus words would probably insure that the test was really a measure of auditory recognition of sound and not a test of knowledge of spelling.

Parts A, B, C, D, E, G, H, I, of Test I were all of the same type. In each item pupils were asked to choose from a series of five words the one which contained within it certain designated sounds heard in two stimulus

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2/Edward L. Thorndike and Irving Lorge, The Teacher's Word Book of 30,000 Words. New York: Bureau of Publications, Teachers College, Columbia University, 1944.

Part B

13. Ability to determine the number of syllables in a word presented orally: Test III

14. Ability to determine the number of syllables in a word presented visually: Test IV

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words spoken by the examiner. Table II shows sample items from Test I, Parts A, B, C, D, E, G, H, I.

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SAMPLE ITEMS FROM TEST I, PARTS A, B, C, D, E, G, H, I

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B: initial blends	3	bridoon, brogan	pig, from, pray, bread, train
C: final consonants	2	fluvial, trefoil	mill, fur, cup, coin, pick
D: final blends	4	nomark, murk	fork, arch, hurt, talk, hard
E: medial consonants 1/	5	helve, hopple	behave, belief, motion, person, gift
G: vowels	1	ken, teff	fan, fish, fond, fell, fun
H: initial syllables	4	convolution, conduce	fondly, connect, kindle, comma, cotton
I: final syllables	2	excoriate, imperate	tonight, locate, liquid, became, recite

Test I, Part F: auditory recognition of sounds in any position, consisted of multiple-response items of a different type. Each item was made up of a series of five separate sounds. Pupils were asked to circle all the sounds they heard in a single stimulus word. The number of sounds to be circled varied from one of the five to four of the five sounds provided in the multiple-response item. In only four of the fifteen items was it

1/In Part E pupils were asked to circle the word which contained anywhere within it the sound with which the stimulus words began.

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G: vowels	1	ken, teff	fan, fish, fond, fell, fun
H: initial syllables	4	convolution, conduce	fondly, connect, kindle, comma, cotton
I: final syllables	2	excoriate, imperate	tonight, locate, liquid, became, recite

Test I, Part F: auditory recognition of sounds in any position, consisted of multiple-response items of a different type. Each item was made up of a series of five separate sounds. Pupils were asked to circle all the sounds they heard in a single stimulus word. The number of sounds to be circled varied from one of the five to four of the five sounds provided in the multiple-response item. In only four of the fifteen items was it

1/In Part E pupils were asked to circle the word which contained anywhere within it the sound with which the stimulus words began.

necessary to circle more than two sounds of the five possible choices. Samples are given in Table III.

TABLE III

SAMPLE ITEMS FROM TEST I, PART F

Auditory Recognition of Sounds in Any Position

Item	Stimulus Word	Multiple-response Item
4	widgeon	n a j f p
7	obex	d f i b v
13	atmolysis	w i m r a

Test I, Part J, was a test of the pupils' auditory recognition of whole words. A sample item from this test is given below.

Item 3

Stimulus word: reticulum Multiple-response item: retroject, matricula, curriculum, reticulin, reticulum

Test II, Part A: ability to blend sounds presented orally, consisted of multiple-choice items from which pupils were to select words which would result if the sounds which were pronounced separately by the examiner were blended into words. A sample follows.

Item

Sounds to be blended: b ŏ t f l ī Multiple-choice item: faply, botby, dotsy, pasfy, botfly

The distractors in the multiple-choice item were selected to contain many of the same sounds as the correct response.

necessary to circle more than two sounds of the five possible choices. Samples are given in Table III.

TABLE III

SAMPLE ITEMS FROM TEST I, PART F

Auditory Recognition of Sounds in Any Position

Item	Stimulus Word	Multiple-response Item
4	widgeon	n a j f p
7	obex	d f i b v
13	atmolysis	w i m r a

Test I, Part J, was a test of the pupils' auditory recognition of whole words. A sample item from this test is given below.

Item 3

Stimulus word: reticulum Multiple-response item:
retroject, matricula, curriculum,
reticulin, reticulum

Test II, Part A: ability to blend sounds presented orally, consisted of multiple-choice items from which pupils were to select words which would result if the sounds which were pronounced separately by the examiner were blended into words. A sample follows.

Item

Sounds to be blended: b ö t f l ī Multiple-choice item:
faply, botby, dotsy,
pasfy, botfly

The distractors in the multiple-choice item were selected to contain many of the same sounds as the correct response.

Test II, Part B tested ability to blend sounds presented visually. Familiar words were used in this test and were presented by means of diacritical spelling. Words were selected which look quite different from their usual spelling when written with the diacritical marks. Pupils were asked to rewrite the words with their conventional spelling. Samples of these items with the expected answers follow.

Items	Answers
2. ĕj	edge
4. kwĕ́schŭn	question

Test III was an attempt to find out the pupils' ability to determine the number of syllables in a word presented orally. Item 3 from this test is given below.

Stimulus Word	Multiple-choice Item
3. dephosphorize	1 2 3 4 5 6 7 8

Test IV: ability to determine the number of syllables in a word presented visually, consisted of a series of words which pupils were asked to divide by drawing slanting lines between the syllables. The correct answer for item 5 is shown below.

5. hy/dri/o/dide

Test V: ability to spell from sound, was made up of five phonetically spelled words. Pupils were asked to write each word exactly as they heard it. Item 2 is shown below.

2. emplastrum

Test VI, Parts A, B, C, tested the ability to recognize words presented

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Items	Answers
2. ĕj	edge
4. kwĕschŭn	question

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Stimulus Word	Multiple-choice Item
3. dephosphorize	1 2 3 4 5 6 7 8

Test IV: ability to determine the number of syllables in a word presented visually, consisted of a series of words which pupils were asked to divide by drawing slanting lines between the syllables. The correct answer for item 5 is shown below.

5. by/dri/o/dide

Test V: ability to spell from sound, was made up of five phonetically spelled words. Pupils were asked to write each word exactly as they heard it. Item 2 is shown below.

2. emplastrum

Test VI, Parts A, B, C, tested the ability to recognize words presented

by means of a tachistoscope set at different speeds. It consisted of multiple-choice items. Pupils were asked to circle the words they saw. Distractors were chosen to include many of the same letters as the correct response. Two items, showing differences in difficulty, are shown below. The words underlined are the correct responses.

Part A, Item 2: within <u>without</u> lockout hideout withdrew

Part C, Item 5: suppletory satisfactory rogatory <u>supplicatory</u> supplement

Test VI, Parts D, E, F: Ability to recall words presented by means of a tachistoscope set at different speeds, was a simple recall test. Spaces were provided in which the pupils were asked to write as much as they had seen and could remember of the words which were flashed.

A copy of the complete preliminary test may be found in Appendix A.

Other Tests

In addition to the series of short auditory and visual tests described in the preceding pages, an informal word pronunciation test was also used. The test was constructed by combining Lists 1 and 2 of the Word Lists Test in the <u>Diagnostic Reading Tests</u>, Section IV: Word Attack.[1]

The writer administered the test individually to 24 pupils in the preliminary study group. The words were typed on small cards, each of which was presented to the pupil for five seconds. In case of errors in pronunciation, the examiner recorded the error as nearly as possible in phonetic spelling. Any pronunciation which was phonetically possible was considered correct in scoring the test. Misplaced accent was not considered

1/Committee on Diagnostic Reading Tests, Inc., Frances Oralind Triggs, Chairman, <u>Diagnostic Reading Tests</u>, Section IV, Part 1, Oral. New York: The Committee on Diagnostic Reading Tests, Inc., 1948.

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Part A, Item 2: within <u>without</u> lockout hideout withdrew

Part C, Item 5: suppletory satisfactory rogatory <u>supplicatory</u>
supplement

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an error.

List 1 of the Morrison-McCall Spelling Scale[1] was administered to all but one of the pupils in the preliminary study population.

Intelligence quotients were procured from the cumulative records of the pupils and are based on the Kuhlmann-Anderson Intelligence Test[2] which was administered to the pupils about seven months before the preliminary study was made. Scores were available for 63 of the 65 pupils.

Reading ages, also taken from the cumulative records, are based on administration of the reading comprehension section of the Iowa Every-Pupil Tests of Basic Skills,[3] also administered about seven months before the time of the preliminary study. Scores were procured for 62 pupils.

Administration and Scoring of the Word Analysis Tests

All auditory and visual tests were administered and scored by the writer. Details of administration procedure are given in the directions for administration in Appendix A. All auditory parts were presented by reading test words or sounds to the pupils with an effort to speak the words or sounds clearly but without exaggeration.

All of the visual tests were administered with the Keystone Overhead Tachistoscope.[4] Slides were made by typing the test words on cellophane and placing them between two pieces of clear glass. A screen was placed in the front of the room, and all pupils were seated so as to have a clear view of the screen.

1/J. Cayce Morrison and William A. McCall, Morrison-McCall Spelling Scale. Yonkers-on-Hudson, New York: World Book Company, 1923.

2/Published by the Personnel Press, Inc., Baltimore, Maryland.

3/Published by Houghton Mifflin Company, Boston, Massachusetts

4/Manufactured and distributed by the Keystone View Company, Meadville, Pennsylvania.

an error.

List I of the Morrison-McCall Spelling Scale [1] was administered to all but one of the pupils in the preliminary study population.

Intelligence quotients were procured from the cumulative records of the pupils and are based on the Kuhlmann-Anderson Intelligence Test [2] which was administered to the pupils about seven months before the preliminary study was made. Scores were available for 63 of the 65 pupils.

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All multiple-choice items were scored right or wrong and one point of credit given for each correct response. Some of the tests required further directions for scoring. These directions may be found in Appendix A.

Population for Preliminary Study

The test was given in December, 1950, to three seventh grade classes, 31 boys and 43 girls, in a small city about forty miles from Boston. Homogeneous grouping is used in the school. The three classes represented a "top" group, a "middle" group, and a "low" group. In this way it was hoped to secure a cross section of the school population. In all, 74 pupils took the test, but nine papers were not used in studying the result because the pupils answered affirmatively one or both of the following questions on the front page of the test:

Do you have any trouble in seeing the blackboard? Yes No

Do you have any trouble in hearing people speak? Yes No

Table IV presents the ranges, means, and standard deviations of the chronological ages, intelligence quotients, reading ages, and spelling scores of the 65 pupils in the preliminary study.

TABLE IV

CHRONOLOGICAL AGES, INTELLIGENCE QUOTIENTS, READING AGES, AND SPELLING SCORES OF PUPILS IN PRELIMINARY STUDY

	Chronological Ages	Intelligence Quotients	Reading Ages	Spelling Scores
Range	11.10 - 17.3	71 - 127	9.0 - 15.2	10-46
Mean	12.903	103.08	11.40	31.798
S.D.	1.033	13.485	1.478	8.286

All multiple-choice items were scored right or wrong and one point of credit given for each correct response. Some of the tests required further directions for scoring. These directions may be found in Appendix A.

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Mean	12.903	103.08	11.10	31.798
S.D.	1.033	13.495	1.474	9.286

An examination of Table IV reveals that these 65 pupils are a fairly representative seventh grade group. A mean chronological age of 12.903 and a standard deviation of only a little over a year would be expected in a school system where the percentage of retardation is fairly low. The range is made to appear abnormally large by the presence in the group of one very much over-age pupil. Except for this one pupil, the range would be from 11-10 to 14-11. The mean intelligence quotient of 103.08 indicates that the ability of the group as a whole is just about average, whereas the range shows that there are both very bright and quite slow children in the group. The mean reading age, as compared with the chronological age, would indicate the group is retarded in reading ability. It should be remembered, however, that the reading test upon which the mean is calculated was given about seven months before the date of testing for the present study. Therefore, it should be concluded that the group as a whole is only slightly retarded in reading ability. In spelling the group is also somewhat retarded. As shown in the table, the mean spelling score of the group is 31.798 with a range from 10 to 46. According to Table 2 in the Morrison-McCall Spelling Scale,[1] the mean score of the group may be translated into a spelling age of 146 months (12.17 years). The range, thus translated, would be from 101 months (8.41 years) to 188 months (15.67 years).

Table V presents a frequency distribution of the scores on the informal word pronunciation test used as a part of the preliminary study.

1/J. Cayce Morrison and William A. McCall, op. cit., p. 4.

An examination of Table IV reveals that these 65 pupils are a fairly representative seventh grade group. A mean chronological age of 12.993 and a standard deviation of only a little over a year would be expected in a school system where the percentage of retardation is fairly low. The range is made to appear abnormally large by the presence in the group of one very much over-age pupil. Except for this one pupil, the range would be from 11-10 to 14.11. The mean intelligence quotient of 109.08 indicates that the ability of the group as a whole is just about average, whereas the range shows that there are both very bright and quite slow children in the group. The mean reading age, as compared with the chronological age, would indicate the group is retarded in reading ability. It should be remembered, however, that the reading test upon which the mean is calculated was given about seven months before the date of testing for the present study. Therefore, it should be concluded that the group as a whole is only slightly retarded in reading ability. In spelling the group is also somewhat retarded. As shown in the table, the mean spelling score of the group is 31.798 with a range from 10 to 46. According to Table 2 in the Morrison-McCall Spelling Scale,[1] the mean score of the group may be translated into a spelling age of 146 months (12.17 years). The range, thus translated, would be from 101 months (8.41 years) to 188 months (15.67 years).

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[1] Dayse Morrison and William A. McCall, op. cit., p. 4.

TABLE V

INFORMAL WORD PRONUNCIATION TEST
IN PRELIMINARY STUDY

Class Intervals	Frequencies
51-53	3
48-50	1
45-47	2
42-44	2
39-41	2
36-38	1
33-35	1
30-32	3
27-29	1
24-26	1
21-23	2
18-20	2
15-17	0
12-14	2
9-11	1

N = 24

Even though only 24 pupils took this individual test, the range of scores indicates that the group included pupils who pronounce words easily and well, those who do the work moderately well, and others for whom this task is very difficult.

Analysis of Test Results

Frequency distributions were made of all the auditory and visual tests in the preliminary study. Some of these distributions are presented in the discussion of results which follows. All others are included in Appendix A. It is apparent from inspection of the distributions that scores on the following tests clustered so much at the top of the range that the tests were too easy even for a seventh grade population and these tests were eliminated.

TABLE V

IRONICAL WORD PRONUNCIATION TEST
IN PRELIMINARY STUDY

Class Intervals	Frequencies
51-53	3
48-50	1
45-47	2
42-44	2
39-41	2
36-38	1
33-35	1
30-32	3
27-29	1
24-26	1
21-23	2
18-20	2
15-17	0
12-14	2
9-11	1

N = 24

Even though only 24 pupils took this individual test, the range of scores indicates that the group included pupils who pronounce words easily and well, those who do the work moderately well, and others for whom this task is very difficult.

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Frequency distributions were made of all the auditory and visual tests in the preliminary study. Some of these distributions are presented in the discussion of results which follows. All others are included in Appendix A. It is apparent from inspection of the distributions that scores on the following tests clustered so much at the top of the range that the tests were too easy even for a seventh grade population and these tests were eliminated.

Test I, Part A: auditory recognition of initial consonants

Test I, Part B: auditory recognition of initial blends

Test I, Part C: auditory recognition of final consonants

Test I, Part D: auditory recognition of final blends

Test I, Part H: auditory recognition of initial syllables

Test I, Part I: auditory recognition of final syllables

Test I, Part J: auditory recognition of whole words

Test II, Part A: ability to blend sounds presented orally.

Other tests were discarded for other reasons. Test I, Part E: auditory recognition of medial consonants, was eliminated because it was felt that the directions were confusing to the pupils and also because recognition of medial consonants was included in a composite test built as part of the revised battery.

Test IV: ability to determine the number of syllables in a word presented visually, was eliminated because it was decided that exact division of words into syllables by visual inspection is probably not an important word analysis skill. Its value as a writing skill in situations calling for division of words at the end of a line in manuscript was not of importance to this study. Also, it was necessary to eliminate several of the very short tests in the preliminary battery in order to allow time to extend the length of the remaining tests and thus make them more reliable.

Some statistical study was made of the more promising tests in the preliminary battery: Test I, Part F: Test I, Part G; Test II, Part B; Test III; Test V; Test VI.

Tables VI through XII present the distributions of scores on these tests.

Test I, Part A: auditory recognition of initial consonants

Test I, Part B: auditory recognition of initial blends

Test I, Part C: auditory recognition of final consonants

Test I, Part D: auditory recognition of final blends

Test I, Part E: auditory recognition of initial syllables

Test I, Part I: auditory recognition of final syllables

Test I, Part J: auditory recognition of whole words

Test II, Part A: ability to blend sounds presented orally.

Other tests were discarded for other reasons. Test I, Part K: auditory recognition of medial consonants, was eliminated because it was felt that the directions were confusing to the pupils and also because recognition of medial consonants was included in a composite test built as part of the revised battery.

Test IV: ability to determine the number of syllables in a word presented visually, was eliminated because it was decided that exact division of words into syllables by visual inspection is probably not an important word analysis skill. Its value as a writing skill in situations calling for division of words at the end of a line in manuscript was not of importance to this study. Also, it was necessary to eliminate several of the very short tests in the preliminary battery in order to allow time to extend the length of the remaining tests and thus make them more reliable.

Some statistical study was made of the more promising tests in the preliminary battery: Test I, Part F: Test I, Part G; Test II, Part B; Test III; Test V; Test VI.

Tables VI through XII present the distributions of scores on these tests.

TABLE VI

TEST I, PART F
Auditory Recognition of Sounds in Any Position

Scores	Frequencies
27	1
26	3
25	3
24	3
23	3
22	8
21	5
20	10
19	8
18	2
17	3
16	8
15	1
14	3
13	1
12	0
11	1
10	2

N = 65

Range = 10 - 27

Mean = 19.54

Standard Deviation = 3.85

The highest possible score on this test is 29. The mean score of 19.54 indicates that the test is somewhat too easy for the population tested.

TABLE VI

TEST I, PART 2
Auditory Recognition of Sounds in Any Position

Scores	Frequencies
27	1
26	2
25	3
24	3
23	3
22	5
21	8
20	5
19	10
18	8
17	2
16	3
15	8
14	1
13	3
12	1
11	0
10	1
	2

N = 65

Range = 10 - 27

Mean = 19.54

Standard Deviation = 3.85

The highest possible score on this test is 29. The mean score of 19.54 indicates that the test is somewhat too easy for the population tested.

TABLE VII

TEST I, PART G
Auditory Recognition of Short Vowel Sounds

Scores	Frequencies
6	3
5	11
4	8
3	15
2	18
1	7
0	3

N = 65

Range = 0 - 6

Mean = 2.97

Standard Deviation = 1.53

The highest possible score on this test is six. The test is too short for the statistics to have much significance, but the mean of 2.97 and the distribution of scores would seem to indicate that the test presented a challenge to the pupils in the preliminary study.

TABLE VIII

TEST II, PART B
Blending a Series of Sounds Presented Visually

Scores	Frequencies
8	6
7	4
6	4
5	7
4	3
3	6
2	12
1	13
0	10

TABLE VII

TEST I, PART B
Auditory Recognition of Short Vowel Sounds

Scores	Frequencies
6	3
5	11
4	8
3	15
2	18
1	7
0	3

N = 65

Range = 0 - 6

Mean = 2.97

Standard Deviation = 1.53

The highest possible score on this test is six. The test is too short for the statistics to have much significance, but the mean of 2.97 and the distribution of scores would seem to indicate that the test presented a challenge to the pupils in the preliminary study.

TABLE VIII

TEST II, PART B
Blending a Series of Sounds Presented Visually

Scores	Frequencies
8	6
7	4
6	4
5	7
4	3
3	6
2	12
1	13
0	10

N = 65

Range = 0 - 8

Mean = 3.11

Standard Deviation = 2.58

Eight is the highest possible score on this test. The mean of 3.11 and the distribution of scores show that the test has possibilities for discriminating among pupils at the seventh grade level.

TABLE IX

TEST III
Determining the Number of Syllables in a Word Presented Orally

Scores	Frequencies
5	25
4	12
3	10
2	9
1	3
0	6

N = 65

Range = 0 - 5

Mean = 3.45

Standard Deviation = 1.37

The scores on Test III tend to cluster at the top of the range. In the form used in the preliminary battery, the test was too easy for seventh grade pupils.

N = 65

Range = 0 - 8

Mean = 3.11

Standard Deviation = 2.58

Eight is the highest possible score on this test. The mean of 3.11 and the distribution of scores show that the test has possibilities for discriminating among pupils at the seventh grade level.

TABLE IX

TEST III

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Scores	Frequencies
5	25
4	12
3	10
2	9
1	3
0	6

N = 65

Range = 0 - 5

Mean = 3.45

Standard Deviation = 1.37

The scores on Test III tend to cluster at the top of the range. In the form used in the preliminary battery, the test was too easy for seventh grade pupils.

TABLE X

TEST V
Ability to Spell from Sound

Intervals	Frequencies
37 - 39	10
34 - 36	20
31 - 33	14
28 - 30	8
25 - 27	5
22 - 24	2
19 - 21	1
16 - 18	0
13 - 15	1
10 - 12	2
7 - 9	1
4 - 6	0
1 - 3	1

N = 65

Range = 1 - 38

Mean = 30.80

Standard Deviation = 7.53

The highest possible score on Test V is 39. Although the scores tend to cluster near the top of the range, and the mean is at 30.80, it appeared that the test had possibilities of usefulness in the main battery.

Because the parts of Test VI are all very short, it was decided to combine Parts A, B, C and Parts D, E, F into two composite scores. Parts A, B, C are all recognition-type tests differing from each other only in the time of the tachistoscopic exposure. Parts D, E, F, are all recall-type (visual memory) tests differing from each other only in the time of tachistoscopic exposure.

TABLE X

TEST V
Ability to Spell from Sound

Intervals	Frequencies
37 - 39	10
34 - 36	20
31 - 33	14
28 - 30	8
25 - 27	5
22 - 24	2
19 - 21	1
16 - 18	0
13 - 15	1
10 - 12	2
7 - 9	1
4 - 6	0
1 - 3	1

N = 65

Range = 1 - 38

Mean = 20.80

Standard Deviation = 7.53

The highest possible score on Test V is 39. Although the scores tend to cluster near the top of the range, and the mean is at 20.80, it appeared that the test had possibilities of usefulness in the main battery.

Because the parts of Test VI are all very short, it was decided to combine Parts A, B, C and Parts D, E, F into two composite scores. Parts A, B, C are all recognition-type tests differing from each other only in the time of the tachistoscopic exposure. Parts D, E, F, are all recall-type (visual memory) tests differing from each other only in the time of tachistoscopic exposure.

TABLE XI

TEST VI, COMBINED PARTS A, B, C
Recognizing Words Presented by Means of a Tachistoscope

Scores	Frequencies
15	3
14	5
13	7
12	9
11	7
10	7
9	12
8	8
7	3
6	1
5	1
4	1
3	0
2	1

N = 65

Range = 2 - 15

Mean = 10.32

Standard Deviation = 2.68

Again, the scores tend to cluster at the top of the distribution, indicating that the test in its trial form was too easy for the population.

Boston University
School of Education
Library

TABLE XI

TEST VI, CONTINUED PARTS A, B, C
Recognizing Words Presented by Means of a Tachistoscope

Scores	Frequencies
15	3
14	5
13	7
12	9
11	7
10	12
9	8
8	5
7	4
6	1
5	0
4	1
3	
2	

N = 65

Range = 2 - 15

Mean = 10.92

Standard Deviation = 2.85

Again, the scores tend to cluster at the top of the distribution, indicating that the test in its trial form was too easy for the population.

Western University
School of Education
Library

TABLE XII

TEST VI, COMBINED PARTS D, E, F
Recalling Words Presented by Means of a Tachistoscope

Intervals	Frequencies
91 - 95	1
86 - 90	2
81 - 85	0
76 - 80	3
71 - 75	4
66 - 70	4
61 - 65	0
56 - 60	5
51 - 55	4
46 - 50	9
41 - 45	9
36 - 40	5
31 - 35	5
26 - 30	3
21 - 25	6
16 - 20	2
11 - 15	0
6 - 10	2
1 - 5	1

N = 65

Range = 1 - 94

Mean = 46.45

Standard Deviation = 20.11

The highest possible score on this test is 114. The mean at 46.45 and the distribution show that the test tended to discriminate well among individuals in the group.

The number of individuals tested, particularly in the case of the individual word pronunciation test (24 pupils), was small. However, coefficients of correlation were computed between the various tests described above and scores in reading and spelling. The results are summarized in Table XIII.

TABLE XII

TEST VI, COMBINED PARTS D, E, F
Recalling Words Presented by Means of a Tachistoscope

Intervals	Frequencies
91 - 95	1
86 - 90	2
81 - 85	0
76 - 80	3
71 - 75	4
66 - 70	4
61 - 65	0
56 - 60	5
51 - 55	4
46 - 50	9
41 - 45	9
36 - 40	5
31 - 35	5
26 - 30	3
21 - 25	6
16 - 20	2
11 - 15	0
6 - 10	2
1 - 5	1

N = 65

Range = 1 - 94

Mean = 46.45

Standard Deviation = 20.11

The highest possible score on this test is 114. The mean at 46.45 and the distribution show that the test tended to discriminate well among individuals in the group.

The number of individuals tested, particularly in the case of the individual word pronunciation test (74 pupils), was small. However, coefficients of correlation were computed between the various tests described above and scores in reading and spelling. The results are summarized in Table XIII.

TABLE XIII

COEFFICIENTS OF CORRELATION OF AUDITORY AND VISUAL TESTS WITH WORD PRONUNCIATION, SPELLING, AND READING

	Individual Word Pronunciation	Spelling	Reading
Test I, Part F	.563	.608	.405
Test I, Part G	.433	.549	.396
Test II, Part B	.701	.719	.574
Test III	.486	.387	.341
Test V	.724	.707	.477
Test VI, Parts A,B,C	.341	.541	.436
Test VI, Parts E,F,G	.606	.614	.530

In studying the relationships in Table XIII, it should be remembered that they are based on a very small population and on very short tests. Most of them are not high, but they provided some encouragement for attempting to build a more reliable test which would, perhaps, bring out more positive information.

Revision of the Test

For the reasons given in the preceding section, certain of the subtests of the preliminary battery were completely discarded. Others were retained but in most instances changed both in length and in form. The principal purpose of the changes was to increase the reliability of the subtests, make them more challenging to the abilities of the pupils, and, in a few instances, make them easier for the pupils to take and for the examiner to score. A detailed description of the revision follows:

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In the revised battery Test I, Part F, became Test I, Part A: auditory recognition of sounds in all positions. It was extended in length from 29 to 116 items. The original test consisted of single consonant and vowel sounds only. Blends were added in the revised test, and the items were arranged in increasing order of complexity. All stimulus words were checked in the Thorndike list[1] and no word was included which occurs more frequently than twice in a million words according to this list. Thirty of the 42 stimulus words do not appear in the Thorndike list at all. Table XIV shows the sounds tested and their position in the test words.

1/Edward L. Thorndike and Irving Lorge, op. cit.

In the revised battery Test I, Part 2, became Test I, Part A: auditory recognition of sounds in all positions. It was extended in length from 29 to 116 items. The original test consisted of single consonant and vowel sounds only. Blends were added in the revised test, and the items were arranged in increasing order of complexity. All stimulus words were checked in the Thorndike List[1] and no word was included which occurs more frequently than twice in a million words according to this List. Thirty of the 42 stimulus words do not appear in the Thorndike List at all. Table XIV shows the sounds tested and their position in the test words.

1/Edward L. Thorndike and Irving Lorge, op. cit.

TABLE XIV

SOUNDS TESTED BY TEST I, PART A
Auditory Recognition of Sounds in All Positions

Item Number	Elements Tested							
	Initial Consonants	Final Consonants	Medial Consonants	Initial Blends	Final Blends	Medial Blends	Short Vowels	Long Vowels
1	r	t						
2		l						
3	m	f						
4	w	n						
5	p	k						
6	g	v						
7	ch							
8	j	sh						
9	f		s					
10	z		k,n					
11	sh		m					
12	v	r						
13	s		d					
14	d	p	v					
15			r,b,f					
16	b	d	g,l					
17				tr	pt			
18		j		sl				
19			t	pr	st	pl		
20			sh		nt			
21		m		fl		gr		
22	h		th		ks	dr		
23	th		p			thr		
24	n	ng	j					
25			w	bl	rt		i	
26		g		sw			a	
27		s	h	wh				e
28				sk	ld			u
29	t				kl			u
30	l				rn		a	
31	k	z					a,o	i
32				sp	bl		i,o	
33	y				lp	wh	e	
34				fr	rm		u,i	
35		th					u	e
36		ch				cr		
37			ng	tw				i
38			y		rd			
39		b				gl	i	o
40						mp	e	
41								o,a
42				st	rk			a

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Item Number	Elements Tested							
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1	r	t						
2		l						
3	m	f						
4	w	n						
5	p	k						
6	s	v						
7	ch							
8	j	sh						
9	f		a					
10	z		k_3n					
11	sh		m					
12	v	r						
13	z		d					
14	d	p	v					
15			r_3b_3f					
16	b	d	s_3l					
17				tr	pt			
18		j		sl				
19			t	pr	st	pl		
20			sh		nt			
21		m		fl		gr		
22	h		th		ks	dr		
23	th		p			thr		
24	n	ng	j					
25			w	bl	rt		i	
26		z		sw			a	
27		s	b	wh				e
28				sk	ld			u
29	t				kl			u
30	l				rm		a	
31	k	s					a_3o	i
32				sp	bl		i_3o	
33	y				lp	wh	e	
34				fr	rm		u_3i	
35		th					u	e
36		ch				cr		
37			ng	tw				i
38			y		rd			
39		b						
40					gl		i	o
41					mp		u	
42				st	rk			o_3a a

The list in Table XIV includes all the single vowel sounds and all the single consonant sounds. Q, a comparatively rare sound, is always combined with u to make the blend kw. X, also omitted, is really a blend of ks. The single consonant sounds are presented in all possible positions: initial, final, and medial, with the exception of z and ch in the medial position. The blends included in the test are selected from the lists of common blends in Durrell [1/] and in Gillingham and Stillman. [2/] Three final blends, ks, pt, bl, and one medial blend, thr, not found on either list were added.

Test I, Part G: auditory recognition of short vowel sounds, was retained and became Test I, Part B, of the revised battery. The length of the test was extended from six to twelve items. The form remained unchanged. A sample item follows:

Directions: Circle the word which contains the same vowel sound as the words you hear. The vowels are a, e, i, o, u.

Stimulus words: hack, raff

Item 1: pep sap cup rip hop

Test III of the preliminary battery became Test II: auditory discrimination of syllables, in the revised test. The test was extended to ten items in place of the original five. None of the stimulus words occurs more than once per million words according to the Thorndike list. A sample item is given below:

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2/Anna Gillingham and Bessie W. Stillman, Remedial Training for Children with Specific Disability in Reading, Spelling and Penmanship, Part Two, Remedial Procedures, Published by the authors and distributed by Anna Gillingham, 25 Parkview Avenue, Bronxville 8, New York, 1946, p. 94.

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Directions: Circle the word which contains the same vowel sound as the words you hear. The vowels are a, e, i, o, u.

Stimulus words: hack, rail

Item 1: pep sap cup rip hop

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Directions: Circle the figure which represents the number of syllables in the word.

Stimulus word: neuropsychosis

Item 9: 1 2 3 4 5 6 7 8

Test III: blending a series of sounds presented visually, is a considerably changed version of Test II, Part B, of the preliminary battery. It consists of fifteen items. Each item is a word written in diacritics. In order not to place too much emphasis on a knowledge of diacritical marks, only the markings for long (-) and short (ᵘ) vowels were used and these were explained with examples. Words were chosen which would, when written in diacritics, look quite different from the same words written in conventional spelling. Pupils were asked to write the words as they would usually be spelled, but, as a further check in case pupils' spellings were so bad as to obscure the intent, they were asked to place each word in one of four categories: animals, vegetables, sports words, or places. Credit was given in scoring if the word was placed in the correct category. Sample items are given with the expected answers:

Item 7: kŏ́l ĕj college (places category)

Item 16: ŭ́n yŭn onion (vegetables category)

Test V: spelling from sound, became Test IV of the revised battery. The test was extended to one hundred fifty items since each sound in the twenty-four words of the test counted as a separate item. Nonsense words were used in order to make certain that no pupil had ever seen the word before. Therefore, success in the test depended entirely on the ability to translate sound into its visual equivalent. To make scoring easier, the pupils' answer sheets contained series of boxes in each of which one

Directions: Circle the figure which represents the number of syllables in the word.

Stimulus word: neuropsychosis

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letter was to be written. Samples are given below.

1.	m	i	p					
12.	j	o	r	k	b	e	s	h
19.	g	a	n	c	l	a	r	p

Test VI, Parts A, B, C, became Test V, Part A, in the revised battery and Test VI, Parts D, E, F, became Test V, Part B. The factor of differentiation of speed was abandoned as was the use of the Keystone tachistoscope. It was felt that the machine itself was a distracting factor in the situation with pupils to whom it was unfamiliar. Also the problem of controlling the amount of light in classrooms without dark shades seemed insuperable.

Therefore, a handmade tachistoscope was constructed and used in both parts of Test VI. It consisted of a wooden frame $16\frac{1}{2}$ by $15\frac{1}{2}$ inches with an opening 3 3/4 by 11 inches.

A shutter fell by gravity past this opening thus exposing very briefly words lettered in India ink on large white cards. The long letters were about one inch tall and the shorter letters about three quarters of an inch. Care was taken to seat all pupils so that they could see the cards clearly, and several practice items were done to accustom the pupils to the movement of the shutter.

Part A of the revised test required a recognition of the word presented from among a choice of five. The distractors were carefully chosen as follows:

Items 1-4: Items consist of four-letter words. Three of the five start with the same two letters. Three of the five words end with the same two letters. Correct answer consists of all four repeated letters.

letter was to be written. Samples are given below.

1.								p	i	m
12.	h	a	e	b	k	r	o	j		
19.	p	r	a	l	c	n	a	g		

Test VI, Parts A, B, C, became Test V, Part A, in the revised battery and Test VI, Parts D, E, F, became Test V, Part B. The factor of differentiation of speed was abandoned as was the use of the Keystone tachistoscope. It was felt that the machine itself was a distracting factor in the situation with pupils to whom it was unfamiliar. Also the problem of controlling the amount of light in classrooms without dark shades seemed insuperable.

Therefore, a handmade tachistoscope was constructed and used in both parts of Test VI. It consisted of a wooden frame 15½ by 15½ inches with an opening 3 3/4 by 11 inches.

A shutter fell by gravity past this opening thus exposing very briefly words lettered in India ink on large white cards. The long letters were about one inch tall and the shorter letters about three quarters of an inch. Care was taken to seat all pupils so that they could see the cards clearly, and several practice items were done to accustom the pupils to the movement of the shutter.

Part A of the revised test required a recognition of the word presented from among a choice of five. The distractors were carefully chosen as follows:

Items 1-4: Items consist of four-letter words. Three of the five start with the same two letters. Three of the five words end with the same two letters. Correct answer consists of all four repeated letters.

Item 1: waft soon lift <u>soft</u> soap

Items 5-8: Items consist of six-letter words. Three of the items start with the same three letters. Three items end with the same three letters. Correct answer contains all six repeating letters.

Item 7: pollen pollute foolish <u>polish</u> girlish

Items 9-12: Items consist of eight-letter words. Three of the items start with the same four letters. Three items end with the same four letters. Correct answer contains all eight repeating letters.

Item 10: <u>visible</u> visitor flexible delible visitress

Items 13-16: Items consist of four-syllable words. Three of the items start with the same two syllables. Three items end with the same two syllables. Correct answer consists of all four repeating syllables.

Item 15: calligraphy <u>geography</u> polygraphy geognostic geogenous

Items 17-20: Items consist of five-syllable words. Three of the words have the same three initial syllables. Three words have the same two final syllables. Correct item contains all five repeating syllables.

Item 18: meteorical meteorolite <u>meteoristic</u> capitalistic impressionistic

Part B of the revised test requires the recall or memory of the words flashed. Pupils were supplied with boxed spaces indicating the number of letters in words. Directions indicated that one letter was to be written in each box. The words ranged from four-letter words to a thirteen-letter word. None occurs more than once per million words according to the Thorndike list.

Item 1: | n | o | d | e |

Item 20: | s | u | s | t | e | n | t | a | c | u | l | a | r |

A complete copy of the revised test with directions for administration and scoring may be found in Appendix B.

Item 1: waft soon lift soft soap

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Items 13-16: Items consist of four-syllable words. Three of the items start with the same two syllables. Three items end with the same two syllables. Correct answer consists of all four repeating syllables.

Item 15: calligraphy geography polygraphy
geognostic geogenous

Items 17-20: Items consist of five-syllable words. Three of the words have the same three initial syllables. Three words have the same two final syllables. Correct item contains all five repeating syllables.

Item 18: meteorical meteorolite meteoristic
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CHAPTER IV

PLAN OF MAIN STUDY

The purposes of the study were to:

1. Construct a group test to measure certain word analysis abilities at the junior-senior high school level
2. Study the reliability and validity of the test constructed
3. Determine the relationships of various word analysis abilities as measured by the test to reading and spelling achievement.

Description of Tests

1. Standardized Tests

The Otis Quick-Scoring Mental Ability Test,[1] Beta, was given to pupils in grades 7 and 9 in order to obtain a measure of mental age. The Gamma form of the same test was used with pupils in grade 11.

The Cooperative Reading Comprehension Test,[2] C_1T, was given to pupils in all three grades. This test yields three scores. The first is a vocabulary score based on sixty items. The vocabulary test measures knowledge of the meaning of individual words out of context.

The Cooperative test also provides a speed of comprehension score, based on the reading of short selections, usually one

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paragraph in length. Multiple-choice questions are provided for each short selection.

The third Cooperative score is a measure of level of comprehension. Because the three scores measure different aspects of reading ability, they were kept separate in analyzing the data.

For testing spelling alternate items were taken from List 2 of the Morrison-McCall Spelling Scale.[1] The test was made more difficult by adding nine words from list AA of the Buckingham Extension of the Ayres Spelling Scale.[2] The total spelling test as used in the study consisted of 34 words. The words ranged from very easy to quite difficult.

Copies of all the standardized tests may be found in Appendix B.

2. Informal tests

In addition to the revised test of word analysis abilities described at the conclusion of Chapter III, a new informal word pronunciation test was constructed. This test consisted of the last forty words from the vocabulary section of the Cooperative Reading Comprehension Test, C_1T, with the addition of twenty more difficult words taken from an unpublished test constructed by Donald D. Durrell.[3] Each word was typed on a small individual card. The examiner, sitting beside the pupil, turned the cards at the rate of one each five seconds. Instructions to the pupils were

1/J. Cayce Morrison and William A. McCall, op. cit.

2/B. R. Buckingham, Buckingham Extension of the Ayres Spelling Scale. Bloomington, Illinois: Public School Publishing Company.

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as follows:

> This is a test of your ability to pronounce words correctly. Take time enough to look at each word carefully. What you say the first time is what counts. If you do not know a word, you may be able to figure out what it is. Do this silently. When you are ready to say the whole word, say it out loud.
>
> In scoring, any phonetically correct pronunciation was accepted.

3. Screening of vision and hearing

A simple screening device was used as a preliminary to the word analysis test. The directions appear on the front page of the test. Pupils were shown two unfamiliar words, phenazine and mescal, printed on large white cards in exactly the same size and form in which items in the visual parts of the test later appear. They were asked to copy these words on lines provided for the purpose. The examiner then pronounced words which pupils were asked to select from among other words of similar sound in three multiple-choice items.

Administration and Scoring of Tests

The tests were given in May and June, 1952, in grades 7, 9, and 11 in four schools in a city near Boston. It was felt that the pupils in the schools of this city provided a representative cross section in socio-economic background, intelligence, and school achievement. Principals of the schools were asked to select classes for testing which would represent all levels of ability. All tests except the individually administered word pronunciation test were taken by 607 pupils, of whom 5 were eliminated from the statistical study because of failure in the vision and/or hearing screening test given as a preliminary

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> This is a test of your ability to pronounce words correctly. Take time enough to look at each word carefully. What you say the first time is what counts. If you do not know a word, you may be able to figure out what it is. Do this silently. When you are ready to say the whole word, say it out loud.

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to the word analysis test. Six hundred two sets of tests were used in studying the data.

All the tests were administered by the writer. Scoring was done by hand by the writer and others working in close cooperation with the writer. Because some of the scoring was difficult, with considerable chance for error, many of the tests were scored a second time. Detailed directions for administration and scoring of all the informal tests are included in Appendix B.

Test Population

The ensuing tables provide a description of the test population.

TABLE XV

SEX OF PUPILS IN MAIN STUDY

	Grade 7	Grade 9	Grade 11	Total
Boys	106	104	79	289
Girls	115	77	121	313
Total	221	181	200	602

TABLE XVI

CHRONOLOGICAL AGES OF PUPILS IN MAIN STUDY
(Reported in Months)

	Grade 7	Grade 9	Grade 11
Mean	156.76	181.59	203.100
S.D.	8.685	8.415	6.633

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S.D.	8.695	8.125	6.633

A mean chronological age of slightly over 13 years near the end of grade seven, of not quite 15 years near the end of grade nine, and of not quite 17 near the end of grade eleven is normal. A standard deviation of less than a year would be expected in a school system where the percentage of retardation is low.

TABLE XVII

MENTAL AGES OF PUPILS IN MAIN STUDY
(Reported in Months)

	Grade 7	Grade 9	Grade 11
Mean	162.64	190.57	213.850
S.D.	15.675	17.490	22.855

A comparison of the mean mental ages with the mean chronological ages presented in Table XVI indicates that the test population was somewhat above average in intelligence.

TABLE XVIII

READING VOCABULARY SCORES OF PUPILS IN MAIN STUDY
(Cooperative Test Raw Scores)

	Grade 7	Grade 9	Grade 11
Mean	14.784	21.967	31.500
S.D.	9.429	11.709	13.220

The mean raw scores are more meaningful if translated into percentile ranks.[1] The corresponding percentile rank for grade 7 is 73; for grade 9,

[1] Norms used are national norms published by the Cooperative Test Division of the Educational Testing Service, Princeton, New Jersey.

A mean chronological age of slightly over 13 years near the end of grade seven, of not quite 15 years near the end of grade nine, and of not quite 17 near the end of grade eleven is normal. A standard deviation of less than a year would be expected in a school system where the percentage of retardation is low.

TABLE XVII

MENTAL AGES OF PUPILS IN MAIN STUDY
(Reported in Months)

	Grade 7	Grade 9	Grade 11
Mean	162.64	190.57	213.850
S.D.	15.675	17.490	22.655

A comparison of the mean mental ages with the mean chronological ages presented in Table XVI indicates that the test population was somewhat above average in intelligence.

TABLE XVIII

READING VOCABULARY SCORES OF PUPILS IN MAIN STUDY
(Cooperative Test Raw Scores)

	Grade 7	Grade 9	Grade 11
Mean	14.784	21.967	31.500
S.D.	9.429	11.707	13.220

The mean raw scores are more meaningful if translated into percentile ranks.[1] The corresponding percentile rank for grade 7 is 73; for grade 9,

[1] Norms used are national norms published by the Cooperative Test Division of the Educational Testing Service, Princeton, New Jersey.

47; for grade 11, 42. This would seem to indicate that the seventh grade group is an above average group in vocabulary; the other two groups are slightly below average.

TABLE XIX

READING SPEED SCORES OF PUPILS IN MAIN STUDY
(Cooperative Test Raw Scores)

	Grade 7	Grade 9	Grade 11
Mean	12.179	19.715	28.175
S.D.	8.871	11.315	15.030

Similarly, the percentile ranks corresponding to the mean scores in speed are 69 for grade 7; 58 for grade 9, and 55 for grade 11. The pupils, particularly the seventh grade group, are somewhat above average in speed.

TABLE XX

READING COMPREHENSION SCORES OF PUPILS IN MAIN STUDY
(Cooperative Test Raw Scores)

	Grade 7	Grade 9	Grade 11
Mean	8.926	14.715	21.100
S.D.	6.396	10.450	13.590

Because the table used in computing the scores on the level of comprehension section of the Cooperative Test varies in relation to the amount of the test completed by the pupil, no exact percentile equivalents can be given for these mean scores. However, since most of the pupils completed only Level 1 of the test, scores have been computed on this basis. They show the test population to be considerably above average in

47; for grade 11, 42. This would seem to indicate that the seventh grade group is an above average group in vocabulary; the other two groups are slightly below average.

TABLE XIX

READING SPEED SCORES OF PUPILS IN MAIN STUDY
(Cooperative Test Raw Scores)

	Grade 7	Grade 9	Grade 11
Mean	12.179	19.715	26.175
S.D.	6.971	11.315	15.030

Similarly, the percentile ranks corresponding to the mean scores in speed are 69 for grade 7; 58 for grade 9, and 55 for grade 11. The pupils, particularly the seventh grade group, are somewhat above average in speed.

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comprehension: grade 7, 71; grade 9, 68; grade 11, 81.

TABLE XXI

SPELLING SCORES OF PUPILS IN MAIN STUDY

	Grade 7	Grade 9	Grade 11
Mean	19.848	24.302	28.240
S.D.	5.198	5.502	4.482

Since the spelling test was a combination of parts of two standardized tests, it is not possible to compare the mean scores with any grade norms. The highest possible score on the test is 34. The test is somewhat too easy for the population tested, especially for grade 11. However, it distinguishes well among the three grade levels, as Table XXII shows.

TABLE XXII

COMPARISON OF MEAN SCORES IN SPELLING OF GRADES 7, 9, AND 11

Grades	Means	S.D.	$S.E._M$	Diff. of Means	S.E. Diff.	C.R.
7	19.848	5.198	.350		.539	8.26
9	24.302	5.502	.409	4.454		
9	24.302	5.502	.409		.517	7.81
11	28.240	4.482	.317	3.938		
7	19.848	5.198	.350		.472	17.78
11	28.240	4.482	.317	8.392		

comprehension: grade 7, 71; grade 9, 68; grade 11, 82.

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9	24.302	5.502	.409			
				.517		7.81
11	28.240	4.482	.317	3.938		
7	19.848	5.198	.350			
				.472		17.78
11	28.240	4.482	.317	8.392		

TABLE XXIII

INFORMAL WORD PRONUNCIATION TEST IN MAIN STUDY

	Grade 7 N=38	Grade 9 N=44	Grade 11 N=39
Range	2 - 58	13 - 58	25 - 60
Mean	40.211	43.385	50.615
S.D.	13.958	13.911	9.120

The reliability of this informal word pronunciation test was calculated by computing a coefficient of correlation by the split-half method and estimating the reliability coefficient of the whole test by means of the Spearman-Brown formula. The resulting coefficient of reliability is .949.

Since the highest possible score on the test is 60, it is apparent from the mean scores that the test was somewhat too easy for the population. However, as Table XXIV shows, the test is very sensitive to differences in ability between grade levels. All critical ratios showing the significance of differences between the means are well above the one per cent level of significance.

TABLE XXIII

INFORMAL WORD PRONUNCIATION TEST IN MAIN STUDY

	Grade 7 N=34	Grade 9 N=22	Grade 11 N=29
Range	2 - 58	13 - 58	25 - 60
Mean	40.211	42.385	50.615
S.D.	13.958	12.911	9.120

The reliability of this informal word pronunciation test was calculated by computing a coefficient of correlation by the split-half method and estimating the reliability coefficient of the whole test by means of the Spearman-Brown formula. The resulting coefficient of reliability is .949.

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TABLE XXIV

COMPARISON OF MEAN SCORES OF GRADES 7, 9, AND 11
ON INDIVIDUAL WORD PRONUNCIATION TEST

Grades	Means	S.D.	$S.E._M$	Diff. of Means	S.E. Diff.	C.R.
7	40.211	13.958	.939		1.40	2.27
9	43.385	13.911	1.034	3.174		
9	43.385	13.911	1.034		1.22	5.93
11	50.615	9.120	.645	7.230		
7	40.211	13.958	.939		1.139	9.13
11	50.615	9.120	.645	10.404		

The population which was used in the main study and which is described in the foregoing tables may be said to be normal in chronological age, somewhat above average in intelligence and also in reading ability as measured by a standardized test.

No norms are available for determining the standing of the pupils in spelling and word pronunciation. A study of the significance of the differences between the mean scores of grades 7, 9, and 11 indicates that the spelling test differentiates well between the abilities of grades 7 and 9, 9 and 11, and 7 and 11. The individually administered word pronunciation test differentiates well between grades 9 and 11 and grades 7 and 11, but the difference between grades 7 and 9 is not significant at the .01 per cent level.

TABLE XXIV

COMPARISON OF MEAN SCORES OF GRADES 7, 9, AND 11
ON INDIVIDUAL WORD PRONUNCIATION TEST

Grades	Means	S.D.	S.E.M	Diff. of Means	S.E. Diff.	C.R.
7	40.211	13.958	.939			
9	43.385	13.911	1.034	3.174	1.40	2.27
9	43.385	13.911	1.034			
11	50.615	9.120	.645	7.230	1.22	5.93
7	40.211	13.958	.939			
11	50.615	9.120	.645	10.404	1.239	9.13

The population which was used in the main study and which is described in the foregoing tables may be said to be normal in chronological age, somewhat above average in intelligence and also in reading ability as measured by a standardized test.

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CHAPTER V

ANALYSIS OF DATA

The data were analyzed primarily to examine the reliability and validity of the test itself as an instrument for measuring the following aspects of word analysis power among pupils in grades seven, nine, and eleven:

1. Auditory recognition of sounds in various positions
2. Auditory recognition of syllables
3. Ability to blend sounds presented visually
4. Ability to spell by sound
5. Recognition of words presented by means of a tachistoscope
6. Recall of words presented by means of a tachistoscope.

In the second place, some further study was made of the relationship of results of the word analysis test to spelling and to reading as measured both by a standardized group test of reading and by an individually administered word pronunciation test. These relationships were studied by means of Pearson product-moment coefficients of correlation.

Since it seemed important to determine what the relationships would be without the factor of mental age, a partial correlation study was made in which the factor of mental age was held constant.

The question of whether or not boys have more difficulty than girls with the skills measured by this test was investigated by computing the significance of the difference between the means of boys and girls on the

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The question of whether or not boys have more difficulty than girls with the skills measured by this test was investigated by computing the significance of the difference between the means of boys and girls on the

various subtests.

In the ensuing pages, each subtest will be interpreted separately. The following information will be presented about each test:

1. Item analysis study. Each individual item was studied to determine to what extent it differentiates between pupils with high scores and those with low scores. In the case of each subtest the high twenty-five per cent of the population, one hundred fifty-one pupils, and the low twenty-five per cent of the population, one hundred fifty-one pupils, were selected. A tabulation was made of the percentage of correct scores on each item made by the high group and the percentage of correct scores on each item made by the low group. In the case of multiple-response items, the various parts of the score were weighted to make a total score for the whole item. For each item the difference between the percentage of correct answers made by the high group and the percentage of correct answers made by the low group was found. The standard error of the difference between the two percentages was calculated with the use of Edgerton's Tables.[1/] From this information a critical ratio was computed for each individual item. It was found that in the case of only two of the items was the critical ratio smaller than 2.58. Therefore, it may be concluded that all the items with the exception of these two differentiate significantly between the high and low groups of pupils.

2. Distribution of scores. The tables presenting these distributions

1/Harold A. Edgerton and Donald G. Paterson, "Table of Standard Errors and Probable Errors of Percentages for Varying Numbers of Cases," Journal of Applied Psychology, 10:7 pp., September, 1926.

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indicate by grade and by sex the range of scores, the means, and the standard deviations of each subtest.

3. Comparison of mean scores. Tables are arranged to show the significance of the differences between the means of grade seven and grade nine, grade nine and grade eleven, and grade seven and grade eleven. One measure of the sensitivity of a test is the ascending order of means between grades.

4. Reliability. The reliability of each subtest was computed by the split-half or odd-even method. The reliability coefficient was estimated for the whole subtest by use of the Spearman-Brown formula.

5. Relationships of performance on the test to spelling and to word pronunciation. These relationships are indicated by Pearson product-moment coefficients of correlation and also by partial correlation coefficients with the factor of mental age held constant. For the purpose of the partial correlation study it was necessary to obtain correlations of mental age with all the subtests of the battery and with spelling and word pronunciation. These correlations are reported in Table XXV.

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TABLE XXV

CORRELATION COEFFICIENTS OF MENTAL AGE WITH WORD ANALYSIS SUBTESTS, WORD PRONUNCIATION AND SPELLING

TESTS	COEFFICIENTS OF CORRELATION
Test I, Part A	.647
Test II	.300
Test III	.549
Test IV	.609
Test V, Part A	.226
Test V, Part B	.494
Word Pronunciation	.565
Spelling	.668

A separate section of the chapter includes a discussion of sex differences in performance on the test. The relationship of performance on the test to performance on the three parts of the standardized reading test is also discussed in a separate section. The chapter concludes with tables showing intercorrelations of the various subtests, a summary of the coefficients of reliability and a summary of the correlations with word pronunciation and spelling.

The item analysis statistics, the distribution tables, the study of the differences between the means of the three grade levels, and the sex differences study are all based on the total population.

The reliability coefficients, the study of the relationships of performance on the test to performance on spelling tests and on standardized reading tests, and the study of the intercorrelations of the various

TABLE XXV

CORRELATION COEFFICIENTS OF RELIABILITY, ITEM WORD ANALYSIS SUBTESTS, WORD PRONUNCIATION AND SPELLING

TESTS	COEFFICIENTS OF CORRELATION
Test I, Part A	.447
Test II	.300
Test III	.549
Test IV	.609
Test V, Part A	.226
Test V, Part B	.424
Word Pronunciation	.565
Spelling	.658

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The item analysis statistics, the distribution tables, the study of the differences between the means of the three grade levels, and the sex differences study are all based on the total population.

The reliability coefficients, the study of the relationships of performance on the test to performance on spelling tests and on standardized reading tests, and the study of the intercorrelations of the various

subtests are based on half of the population, 300 pupils. The coefficients of correlation of the various subtests with the word pronunciation test are based on a population of 121 pupils to whom the individually administered word pronunciation test was given.

Pupils in the group of 121 to whom the individual test was administered were selected by the principals of the three junior high schools involved in the study and by the guidance director of the one senior high school. These persons were asked to select for this purpose a group of pupils representing high, average, and low achievers in school.

The group of 300 pupils used in the reliability study and in the study of relationships of the word analysis test to other tests includes the 121 pupils in the individual word pronunciation group plus 179 more pupils selected by taking every second pupil alphabetically until a total of 100 for each grade was reached.

In order to determine whether these two selected groups were truly representative of the total population, the ranges, means, and standard deviations of each group were computed for each of the tests. The results of this study are presented in Table XXVI.

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TABLE XXVI

RANGES, MEANS, AND STANDARD DEVIATIONS OF THE THREE GROUPS USED IN THE ANALYSIS OF DATA

	Individual Word Pronunciation (121 pupils)	Half Population (300 pupils)	Total Population (602 pupils)
	Test I, Part A		
Range	44 - 108	44 - 110	38 - 110
Mean	84.59	85.23	85.62
S.D.	14.55	13.59	13.26
	Test II		
Range	1 - 10	0 - 10	0 - 10
Mean	7.19	7.06	7.16
S.D.	2.30	2.57	2.47
	Test III		
Range	0 - 15	0 - 15	0 - 15
Mean	9.76	10.08	10.34
S.D.	4.62	4.41	4.20
	Test IV		
Range	45 - 147	39 - 149	39 - 149
Mean	118.25	118.75	118.95
S.D.	21.7	21.3	20.10
	Test V, Part A		
Range	1 - 20	1 - 20	1 - 20
Mean	15.66	16.04	15.99
S.D.	4.09	3.49	3.38
	Test V, Part B		
Range	1 - 142	1 - 142	0 - 151
Mean	74.19	74.47	74.33
S.D.	31.43	31.15	30.31

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S.D.	2.30	2.57	2.47
Test III			
Range	0 - 15	0 - 15	0 - 15
Mean	9.76	10.08	10.34
S.D.	4.52	4.41	4.20
Test IV			
Range	45 - 147	39 - 149	39 - 149
Mean	118.25	118.75	118.95
S.D.	21.7	21.3	20.10
Test V, Part A			
Range	1 - 20	1 - 20	1 - 20
Mean	15.66	16.04	15.99
S.D.	4.09	3.49	3.38
Test V, Part B			
Range	1 - 142	1 - 142	0 - 151
Mean	74.19	74.47	74.53
S.D.	31.63	31.15	30.31

Analysis of Subtests

Test I, Part A: Recognition of Sounds in All Positions

TABLE XXVII

COMPARISON OF PERCENTAGES OF CORRECT ANSWERS ON TEST I, PART A OF HIGH TWENTY-FIVE PER CENT AND LOW TWENTY-FIVE PER CENT OF PUPILS

Item	Per Cent Correct High Group N=151	Per Cent Correct Low Group N=151	Difference in Per Cent	S.E. Diff.	C.R.
1	99.3	84.1	15.2	.0310	4.90
2	92.1	41.1	51.0	.0457	11.16
3	94.7	64.9	29.8	.0429	6.95
4	96.7	82.8	13.9	.0340	4.08
5	78.8	43.0	35.8	.0519	6.90
6	98.7	77.5	21.2	.0349	6.07
7	99.3	94.7	4.6	.0197	2.33
8	98.7	84.8	13.9	.0301	4.62
9	95.4	71.5	23.9	.0411	5.82
10	85.4	56.3	29.1	.0494	5.89
11	100.0	86.8	13.2	.0282	4.68
12	95.4	71.5	23.9	.0411	5.81
13	96.0	64.2	31.8	.0421	7.55
14	91.4	68.2	23.2	.0444	5.23
15	82.1	45.0	37.1	.0506	7.33
16	84.7	52.3	32.4	.0502	6.45
17	92.7	69.5	23.2	.0434	5.35
18	70.2	55.0	15.2	.0545	2.79
19	86.1	53.6	32.5	.0496	6.55
20	94.0	70.2	23.8	.0416	5.72
21	96.0	69.5	26.5	.0403	6.57
22	74.8	45.0	29.8	.0532	5.60
23	84.1	51.0	33.1	.0508	6.51
24	63.6	51.0	12.6	.0559	2.25
25	82.8	50.0	32.8	.0514	6.38
26	98.7	83.4	15.3	.0320	4.78
27	91.4	68.2	23.2	.0444	5.23
28	87.4	41.7	45.7	.0483	9.46
29	89.4	57.0	32.4	.0472	6.86
30	94.0	58.3	35.7	.0443	8.06
31	76.8	43.0	33.8	.0525	6.44
32	90.1	58.3	31.8	.0466	6.82
33	82.1	51.7	30.4	.0514	5.91
34	79.5	31.8	47.7	.0503	9.48
35	78.1	43.0	35.1	.0525	6.69

(concluded on next page)

Analysis of Subtests

Test I, Part A: Recognition of Sounds in All Positions

TABLE XLVII

COMPARISON OF PERCENTAGES OF CORRECT ANSWERS ON TEST I, PART A OF HIGH TWENTY-FIVE PER CENT AND LOW TWENTY-FIVE PER CENT OF PUPILS

Item	Per Cent Correct High Group N = 127	Per Cent Correct Low Group N = 127	Difference in Per Cent	S.E. Diff.	C.R.
1	99.3	84.1	15.2	.0310	4.90
2	92.1	41.1	51.0	.0457	11.16
3	94.7	64.9	29.8	.0429	6.95
4	96.7	82.8	13.9	.0340	4.08
5	78.8	43.0	35.8	.0519	6.90
6	98.7	77.5	21.2	.0349	6.07
7	99.3	94.7	4.6	.0197	2.33
8	98.7	84.8	13.9	.0301	4.62
9	95.4	71.5	23.9	.0411	5.82
10	85.4	56.3	29.1	.0494	5.89
11	100.0	86.8	13.2	.0382	4.48
12	95.4	71.5	23.9	.0412	5.81
13	96.0	64.2	31.8	.0423	7.52
14	91.4	68.2	23.2	.0444	5.23
15	82.1	45.0	37.1	.0506	7.33
16	84.7	52.3	32.4	.0502	6.45
17	92.7	69.5	23.2	.0434	5.35
18	70.2	55.0	15.2	.0543	2.79
19	86.1	53.6	32.5	.0496	6.55
20	94.0	70.2	23.8	.0413	5.72
21	96.0	69.5	26.5	.0403	6.57
22	74.8	45.0	29.8	.0532	5.60
23	84.1	51.0	33.1	.0505	6.51
24	65.6	51.0	14.6	.0559	2.61
25	82.8	50.0	32.8	.0514	6.38
26	98.7	83.4	15.3	.0320	4.78
27	91.4	66.2	25.2	.0444	5.23
28	87.4	41.7	45.7	.0429	9.46
29	89.4	57.0	32.4	.0472	6.86
30	94.0	58.3	35.7	.0443	8.06
31	76.8	43.0	33.8	.0525	6.44
32	90.1	58.3	31.8	.0465	6.83
33	82.1	51.7	30.4	.0514	5.91
34	79.5	31.8	47.7	.0502	9.49
35	78.1	43.0	35.1	.0525	6.69

(concluded on next page)

TABLE XXVII. (concluded)

Item	Per Cent Correct High Group	Per Cent Correct Low Group	Difference in Per Cent	S.E. Diff.	C.R.
36	94.0	55.0	39.0	.0443	8.80
37	93.4	70.9	22.5	.0425	5.29
38	84.1	53.6	30.5	.0508	6.00
39	94.7	69.5	25.2	.0420	6.00
40	57.6	23.8	33.8	.0531	6.37
41	92.1	43.0	49.1	.0457	10.77
42	95.4	75.5	19.9	.0393	5.06

Table XXVII shows that, with the exception of Items 7 and 24, all items differentiate significantly between the high and low achievers on the total subtest. The very high percentage of correct answers made by the high group on most of the items indicates that the test has little or no ceiling for high achievers. However, since the test is designed as a diagnostic instrument for poor readers, this fact is not of so much importance as it would be if it were an achievement test designed for administration to pupils of all levels of reading ability.

TABLE XXVII. (concluded)

Item	Per Cent Correct High Group	Per Cent Correct Low Group	Difference in Per Cent	S.E. Diff.	C.R.
36	94.0	55.0	39.0	.0443	8.80
37	93.4	70.9	22.5	.0425	5.29
38	84.1	53.6	30.5	.0508	6.00
39	94.7	69.5	25.2	.0420	6.00
40	57.6	23.8	33.8	.0511	6.37
41	92.1	43.0	49.1	.0427	10.77
42	93.4	75.5	19.9	.0393	5.06

Table XXVII shows that, with the exception of Items 7 and 24, all items differentiate significantly between the high and low achievers on the total subtest. The very high percentage of correct answers made by the high group on most of the items indicates that the test has little or no ceiling for high achievers. However, since the test is designed as a diagnostic instrument for poor readers, this fact is not of so much importance as it would be if it were an achievement test designed for administration to pupils of all levels of reading ability.

The distribution of scores for Test I, Part A, is reported in Table XXVIII.

TABLE XXVIII

FREQUENCY DISTRIBUTION OF TEST I, PART A
Recognition of Sounds in All Positions

Highest possible score = 116

Intervals	Grade 7		Grade 9		Grade 11	
	Boys	Girls	Boys	Girls	Boys	Girls
110 - 112			2	1	1	1
107 - 109			0	0	3	12
104 - 106	1		3	3	7	11
101 - 103	1	1	5	6	6	12
98 - 100	4	8	4	10	8	12
95 - 97	6	7	10	6	12	18
92 - 94	6	11	11	7	4	7
89 - 91	6	5	4	9	9	17
86 - 88	10	13	6	8	4	6
83 - 85	6	10	7	8	2	8
80 - 82	3	6	9	4	7	5
77 - 79	14	11	12	3	2	7
74 - 76	11	14	6	3	6	2
71 - 73	11	8	7	2	3	0
68 - 70	6	9	5	3	2	2
65 - 67	5	5	1	1	2	1
62 - 64	4	2	6	1	1	
59 - 61	2	4	2	1		
56 - 58	3	1	0	1		
53 - 55	3		2			
50 - 52	1		0			
47 - 49	0		1			
44 - 46	2		1			
41 - 43	0					
38 - 40	1					
Totals	106	115	104	77	79	121
Range	38 - 106	56 - 103	44 - 110	58 - 110	64 - 110	65 - 110
Mean	77.66	81.33	82.92	88.32	90.45	94.08
S.D.	13.39	10.95	14.71	11.37	11.82	9.90

The distribution of scores for Test I, Part A, is reported in Table XXVIII.

TABLE XXVIII

FREQUENCY DISTRIBUTION OF TEST I, PART A
Recognition of Sounds in All Positions

Highest possible score = 116

Intervals	Grade 7		Grade 9		Grade 11	
	Boys	Girls	Boys	Girls	Boys	Girls
110 - 112			2	1	1	1
107 - 109			0	0	2	12
104 - 106	1		3	3	7	11
101 - 103	1	1	5	6	6	12
98 - 100	4	8	4	10	8	12
95 - 97	6	7	10	6	12	13
92 - 94	6	11	11	7	4	7
89 - 91	6	5	4	9	9	17
86 - 88	10	13	6	8	4	6
83 - 85	6	10	7	8	2	8
80 - 82	3	6	9	4	7	5
77 - 79	14	11	12	3	2	7
74 - 76	11	14	6	3	6	2
71 - 73	11	8	7	2	3	0
68 - 70	6	9	5	3	2	2
65 - 67	5	5	1	1	2	1
62 - 64	4	2	6	1	1	
59 - 61	2	4	2	1		
56 - 58	3	1	0	1		
53 - 55	3		2			
50 - 52	1		0			
47 - 49	0		1			
44 - 46	2		1			
41 - 43	0					
38 - 40	1					
Totals	106	115	104	77	79	121
Range	38 - 106	56 - 103	44 - 110	58 - 110	64 - 110	65 - 110
Mean	77.66	81.33	82.92	88.32	90.45	94.03
S.D.	13.39	10.95	14.71	11.37	11.82	9.90

The significance of the differences in mean scores of the three grades is shown in Table XXIX.

TABLE XXIX

COMPARISON OF MEAN SCORES OF GRADES 7, 9, 11
ON TEST I, PART A

Grades	Means	S.D.	$S.E._M$	Diff. of Means	S.E. Diff.	C.R.
7	79.56	12.33	.829			
					1.27	4.53
9	85.29	13.05	.970	5.73		
9	85.29	13.05	.970			
					1.22	5.90
11	92.49	10.53	.744	7.20		
7	79.56	12.33	.829			
					1.11	11.65
11	92.49	10.53	.744	12.93		

All the critical ratios shown in Table XXIX are significant at the .01 level of confidence. They indicate that, as far as this study is concerned, there are real differences between pupils in grades 7 and 9, 9 and 11, and 7 and 11 in their ability to recognize sounds in different positions.

The significance of the differences in mean scores of the three grades is shown in Table XXIX.

TABLE XXIX

COMPARISON OF MEAN SCORES OF GRADES 7, 9, 11
ON TEST I, PART A

Grades	Means	S.D.	S.E.M	Diff. of Means	S.E. Diff.	C.R.
7	79.56	12.33	.829			
					1.27	4.53
9	85.29	13.05	.970	5.73		
9	85.29	13.05	.970			
					1.22	5.90
11	92.49	10.53	.744	7.20		
7	79.56	12.33	.829			
					1.11	11.65
11	92.49	10.53	.744	12.93		

All the critical ratios shown in Table XXIX are significant at the .01 level of confidence. They indicate that, as far as this study is concerned, there are real differences between pupils in grades 7 and 9, 9 and 11, and 7 and 11 in their ability to recognize sounds in different positions.

The reliability coefficient of Test I, Part A, computed by the split-half, or odd-even, method and estimated for the whole test by the Spearman-Brown formula is .923.

The relationships of the test to word pronunciation and to spelling are shown in Table XXX.

TABLE XXX

RELATIONSHIP OF TEST I, PART A, TO WORD PRONUNCIATION AND SPELLING

Variable	Correlation	Partial Correlation[1] (Mental age held constant)
Word Pronunciation	.813	.712
Spelling	.754	.568

The relationship between the ability to recognize sounds in all positions, as measured by Test I, Part A, and ability to pronounce a list of words ranging from fairly easy to difficult words is high even when the factor of mental age is partialled out. The relationship with spelling is positive and fairly high.

1/Calculated by the following formula for a partial correlation coefficient involving three variables: $r_{12.3} = \frac{r_{12} - r_{13} \cdot r_{23}}{\sqrt{1 - r_{13}^2}\sqrt{1 - r_{23}^2}}$. Henry E. Garrett, Statistics in Psychology and Education. New York: Longmans, Green and Co., 1947, p. 407.

The reliability coefficient of Test I, Part A, computed by the split-half, or odd-even, method and estimated for the whole test by the Spearman-Brown formula is .922.

The relationship of the test to word pronunciation and to spelling are shown in Table XXX.

TABLE XXX

RELATIONSHIP OF TEST I, PART A, TO WORD PRONUNCIATION AND SPELLING

Variable	Correlation	Partial Correlation[1] (Mental age held constant)
Word Pronunciation	.819	.712
Spelling	.754	.568

The relationship between the ability to recognize sounds in all positions, as measured by Test I, Part A, and ability to pronounce a list of words ranging from fairly easy to difficult words is high even when the factor of mental age is partialled out. The relationship with spelling is positive and fairly high.

1/Calculated by the following formula for a partial correlation coefficient involving three variables: $r_{12.3} = \frac{r_{12} - r_{13} \cdot r_{23}}{\sqrt{1 - r_{13}^2}\sqrt{1 - r_{23}^2}}$ Henry E. Garrett, Statistics in Psychology and Education. New York: Longmans, Green and Co., 1947, p. 407.

Test I, Part B: Auditory Recognition of Vowel Sounds

TABLE XXXI

FREQUENCY DISTRIBUTION OF TEST I, PART B
Recognition of Vowel Sounds

Highest possible score = 116

Scores	Grade 7		Grade 9		Grade 11	
	Boys	Girls	Boys	Girls	Boys	Girls
12	18	22	38	26	32	58
11	13	21	18	17	11	17
10	11	15	8	7	10	8
9	15	10	4	2	6	14
8	6	5	6	4	4	3
7	7	13	6	4	4	11
6	9	13	5	7	3	4
5	9	6	10	9	1	2
4	12	7	5	0	2	2
3	4	2	2	0	3	1
2	2	1	2	0	1	0
1				0	1	1
0				1	1	
Totals	106	115	104	77	79	121

It is obvious from a study of Table XXXI that the ninth and eleventh grade scores cluster heavily at the top of the range. Since the test appeared to be far too easy for pupils in these grades and also since recognition of vowel sounds is included in the composite test of all sounds in Test I, Part A, it was decided to eliminate Test I, Part B, without further statistical study.

Test I, Part B: Auditory Recognition of Vowel Sounds

TABLE XXXI

FREQUENCY DISTRIBUTION OF TEST I, PART B
Recognition of Vowel Sounds

Highest possible score = 116

Scores	Grade 7		Grade 9		Grade 11	
	Boys	Girls	Boys	Girls	Boys	Girls
12	18	22	38	26	32	32
11	13	21	18	17	11	17
10	11	15	8	7	10	8
9	15	10	4	2	6	14
8	6	5	6	4	4	3
7	7	13	6	4	4	11
6	9	13	5	7	3	4
5	9	6	10	3	1	3
4	12	7	5	0	2	2
3	4	2	2	0	3	1
2	2	1	2	0	1	0
1				0	1	1
0				1	1	
Totals	105	115	104	77	79	121

It is obvious from a study of Table XXXI that the ninth and eleventh grade scores cluster heavily at the top of the range. Since the test appeared to be far too easy for pupils in these grades and also since recognition of vowel sounds is included in the composite test of all sounds in Test I, Part A, it was decided to eliminate Test I, Part B, without further statistical study.

Test II: Auditory Recognition of Syllables

TABLE XXXII

COMPARISON OF PERCENTAGES OF CORRECT ANSWERS ON TEST II OF HIGH TWENTY-FIVE PER CENT AND LOW TWENTY-FIVE PER CENT OF PUPILS

Item	Per Cent Correct High Group N=151	Per Cent Correct Low Group N=151	Difference in Per Cent	S.E. Diff.	C.R.
1	98.0	50.3	47.7	.0424	11.25
2	100.0	57.6	42.4	.0408	10.39
3	98.7	31.1	67.6	.0387	17.47
4	95.4	18.5	76.9	.0367	20.95
5	98.0	16.6	81.4	.0329	24.74
6	100.0	59.6	40.4	.0408	9.90
7	99.3	29.1	70.2	.0379	18.52
8	100.0	37.7	62.3	.0408	15.27
9	100.0	31.1	68.9	.0388	17.76
10	92.1	29.8	62.3	.0430	14.49

All the items in Test II differentiate very significantly between the high and low achievers on the total subtest.

Test II: Auditory Recognition of Syllables

TABLE XXXII

COMPARISON OF PERCENTAGES OF CORRECT ANSWERS ON TEST II
OF HIGH TWENTY-FIVE PER CENT AND LOW TWENTY-FIVE PER CENT OF PUPILS

Item	Per Cent Correct High Group	Per Cent Correct Low Group	Difference in Per Cent	S.E. Diff.	C.R.
1	98.0	50.3	47.7	.0424	11.25
2	100.0	57.5	42.4	.0408	10.39
3	98.7	31.1	67.6	.0387	17.47
4	95.4	18.5	76.9	.0367	20.95
5	98.0	16.5	81.4	.0329	24.74
6	100.0	59.5	40.4	.0408	9.90
7	99.3	29.1	70.2	.0377	18.52
8	100.0	37.7	62.3	.0408	15.27
9	100.0	31.1	68.9	.0388	17.76
10	92.1	29.8	62.3	.0430	14.49

All the items in Test II differentiate very significantly between the high and low achievers on the total subtest.

TABLE XXXIII

FREQUENCY DISTRIBUTION OF TEST II
Auditory Recognition of Syllables

Highest possible score = 10

Scores	Grade 7		Grade 9		Grade 11	
	Boys	Girls	Boys	Girls	Boys	Girls
10	11	22	15	25	17	33
9	21	21	19	11	14	26
8	12	16	13	12	7	14
7	18	16	14	5	13	21
6	5	9	12	10	9	5
5	14	7	8	5	4	14
4	15	8	11	3	4	7
3	5	5	5	5	7	1
2	1	6	3	1	3	
1	2	3	2		1	
0	2	2	2			
Totals	106	115	104	77	79	121
Range	0 - 10	0 - 10	0 - 10	2 - 10	1 - 10	3 - 10
Mean	6.61	6.96	6.75	7.71	7.10	7.88
S.D.	2.47	2.71	2.57	2.29	2.51	1.95

The clustering of scores at the top of the distributions shows that this test was much too easy for the population tested. Perhaps the comparatively low correlations of the results of the test with both word recognition and spelling may be partly accounted for by the lack of discriminating power in the test itself.

TABLE XXXIII

FREQUENCY DISTRIBUTION OF TEST II
Auditory Recognition of Syllables

Highest possible score = 10

Scores	Grade 7		Grade 9		Grade 11	
	Boys	Girls	Boys	Girls	Boys	Girls
10	11	22	15	25	17	23
9	21	21	19	11	14	26
8	12	16	13	12	7	14
7	18	16	14	5	13	21
6	5	9	12	10	9	5
5	14	7	8	5	4	14
4	15	8	11	3	4	1
3	5	5	5	5	7	1
2	1	6	3	1	3	
1	2	3	2		1	
0	2	2	2			
Totals	106	115	104	77	79	121
Range	0 - 10	0 - 10	0 - 10	2 - 10	1 - 10	3 - 10
Mean	6.61	6.96	6.75	7.71	7.10	7.89
S.D.	2.47	2.71	2.57	2.29	2.51	1.95

The clustering of scores at the top of the distributions shows that this test was much too easy for the population tested. Perhaps the comparatively low correlations of the results of the test with both word recognition and spelling may be partly accounted for by the lack of discriminating power in the test itself.

The significance of the differences of the mean scores of the three grades is shown in Table XXXIV.

TABLE XXXIV

COMPARISON OF MEAN SCORES OF GRADES 7, 9, AND 11 ON TEST II

Grades	Means	S.D.	$S.E._M$	Diff. of Means	S.E. Diff.	C.R.
7	6.83	2.61	.175			
					.254	1.30
9	7.16	2.50	.185	.33		
9	7.16	2.50	.185			
					.241	1.74
11	7.58	2.22	.156	.42		
7	6.83	2.61	.175			
					.234	3.21
11	7.58	2.22	.156	.75		

The critical ratios in Table XXXIV show that there is significant growth in auditory recognition of syllables as measured by Test II between grades 7 and 11. The difference between the mean scores of these two grades is significant at the .01 level. Growth in the skill occurs between grade 7 and grade 9 and between grade 9 and grade 11, but the growth is too small to be significant.

The reliability coefficient of Test II is .817. This comparatively low reliability coefficient may be partly the result of the shortness of the test.

The relationships of the test to word pronunciation and to spelling are shown in Table XXXV.

The significance of the differences of the mean scores of the three grades is shown in Table XXXIV.

TABLE XXXIV

COMPARISON OF MEAN SCORES OF GRADES 7, 9, AND 11 ON TEST II

Grades	Means	S.D.	S.E.M	Diff. of Means	S.E. Diff.	C.R.
7	6.83	2.61	.175			
					.254	1.30
9	7.16	2.50	.185	.33		
9	7.16	2.50	.185			
					.241	1.74
11	7.58	2.22	.156	.42		
7	6.83	2.61	.175			
					.234	3.21
11	7.58	2.22	.156	.75		

The critical ratios in Table XXXIV show that there is significant growth in auditory recognition of syllables as measured by Test II between grades 7 and 11. The difference between the mean scores of these two grades is significant at the .01 level. Growth in the skill occurs between grade 7 and grade 9 and between grade 9 and grade 11, but the growth is too small to be significant.

The reliability coefficient of Test II is .81. This comparatively low reliability coefficient may be partly the result of the shortness of the test.

The relationships of the test to word pronunciation and to spelling are shown in Table XXXV.

TABLE XXXV

RELATIONSHIP OF TEST II TO WORD PRONUNCIATION AND SPELLING

Variable	Correlation	Partial Correlation (Mental age held constant)
Word Pronunciation	.397	.290
Spelling	.357	.221

Test II: auditory recognition of syllables, is apparently not measuring a skill which is important in relation to either word pronunciation or spelling.

Test III: Blending Sounds Presented Visually

TABLE XXXVI

COMPARISON OF PERCENTAGES OF CORRECT ANSWERS ON TEST III OF HIGH TWENTY-FIVE PER CENT AND LOW TWENTY-FIVE PER CENT OF PUPILS

Item	Per Cent Correct High Group N=151	Per Cent Correct Low Group N=151	Difference in Per Cent	S.E. Diff.	C.R.
4	90.1	11.3	78.8	.0347	22.71
5	99.3	42.4	56.9	.0408	13.95
6	100.0	61.6	38.4	.0408	9.41
7	99.3	17.9	81.4	.0320	25.44
8	98.7	27.8	70.9	.0379	18.71
9	99.3	66.2	33.1	.0398	8.32
10	99.3	55.6	43.7	.0408	10.71
11	100.0	39.7	60.3	.0408	14.78
12	100.0	29.1	70.9	.0379	18.71
13	86.1	1.3	84.8	.0291	29.14
14	99.3	8.6	90.7	.0243	37.33
15	100.0	10.6	89.4	.0262	34.12
16	96.7	15.9	80.8	.0331	24.41
17	98.0	17.9	80.1	.0329	24.35
18	99.3	12.6	86.7	.0282	30.74

All items in Test III differentiate very significantly between the high and low achievers on the total subtest.

TABLE XXXV

RELATIONSHIP OF TEST II TO WORD PRONUNCIATION AND SPELLING

Variable	Correlation	Partial Correlation (Mental age held constant)
Word Pronunciation	.397	.290
Spelling	.357	.221

Test II: auditory recognition of syllables, is apparently not measuring a skill which is important in relation to either word pronunciation or spelling.

Test III: Blending Sounds Presented Visually

TABLE XXXVI

COMPARISON OF PERCENTAGES OF CORRECT ANSWERS ON TEST III OF HIGH TWENTY-FIVE PER CENT AND LOW TWENTY-FIVE PER CENT OF PUPILS

Item	Per Cent Correct High Group (N=127)	Per Cent Correct Low Group (N=127)	Difference in Per Cent	S.E. Diff.	C.R.
4	90.1	11.9	78.8	.034	23.17
5	99.3	46.4	53.9	.040	13.25
6	100.0	61.6	38.4	.042	9.14
7	99.3	17.9	81.4	.039	25.44
8	98.7	21.8	76.9	.037	18.71
9	99.3	66.2	33.1	.039	8.32
10	99.3	55.6	43.7	.040	10.71
11	100.0	39.7	60.3	.041	14.78
12	100.0	29.1	70.9	.037	18.71
13	86.1	1.3	84.8	.029	29.14
14	99.3	8.6	90.7	.034	27.33
15	100.0	10.6	89.4	.032	34.12
16	95.7	15.9	80.3	.031	24.12
17	98.0	17.9	80.1	.039	24.35
18	99.3	12.5	86.7	.028	30.74

All items in Test III differentiate very significantly between the high and low achievers on the total subtest.

TABLE XXXVII

FREQUENCY DISTRIBUTION OF TEST III
Blending Sounds Presented Visually

Highest possible score = 15

Scores	Grade 7		Grade 9		Grade 11	
	Boys	Girls	Boys	Girls	Boys	Girls
15	4	10	9	13	18	45
14	9	14	16	12	16	24
13	8	13	9	7	16	7
12	5	7	9	5	5	18
11	10	5	8	10	7	6
10	8	6	11	7	6	4
9	8	10	6	5	2	3
8	8	5	4	3	1	6
7	6	8	6	1	3	2
6	7	8	3	2	1	2
5	11	11	6	0	1	2
4	2	6	7	5	1	1
3	3	5	2	3	1	0
2	8	2	3	1	1	1
1	6	3	0	3		
0	3	2	5			
Totals	106	115	104	77	79	121
Range	0 - 15	0 - 15	0 - 15	1 - 15	2 - 15	2 - 15
Mean	8.06	9.12	9.60	10.60	12.23	12.74
S.D.	4.28	4.24	4.28	4.07	2.99	2.83

TABLE XXXVII

FREQUENCY DISTRIBUTION OF TEST III
Blending Sounds Presented Visually

Highest possible score = 15

Scores	Grade 7		Grade 9		Grade 11	
	Boys	Girls	Boys	Girls	Boys	Girls
15	4	10	9	13	18	45
14	9	14	16	12	16	24
13	8	13	9	7	16	7
12	5	7	9	5	5	13
11	10	5	8	10	7	5
10	8	6	11	7	8	4
9	8	10	6	5	3	3
8	8	5	4	3	1	0
7	6	8	6	4	3	2
6	7	8	3	2	1	2
5	11	6	0	1	1	2
4	2	6	7	5	1	1
3	3	3	2	3	1	0
2	8	2	3	1	1	1
1	6	3	0	3		
0	3	2	5			
Totals	106	115	104	77	79	121
Range	0 - 15	0 - 15	0 - 15	1 - 15	2 - 15	2 - 15
Mean	8.06	7.12	9.60	10.90	12.29	12.74
S.D.	4.28	4.24	4.28	4.07	2.97	2.83

The significance of the differences of the mean scores of the three grades is reported in Table XXXVIII.

TABLE XXXVIII

COMPARISON OF MEAN SCORES OF GRADES 7, 9, AND 11 ON TEST III

Grades	Means	S.D.	$S.E._M$	Diff. of Means	S.E. Diff.	C.R.
7	8.61	4.30	.289		.419	3.37
9	10.02	4.10	.305	1.41		
9	10.02	4.10	.305		.367	6.84
11	12.53	2.91	.206	2.51		
7	8.61	4.30	.289		.353	11.10
11	12.53	2.91	.206	3.92		

Growth in ability to blend sounds presented visually is positive and significant between grades 7 and 9, 9 and 11, and 7 and 11.

The reliability coefficient of Test III is .927.

The relationships of the test to spelling and to word pronunciation are summarized in Table XXXIX.

TABLE XXXIX

RELATIONSHIP OF TEST III TO WORD PRONUNCIATION AND SPELLING

Variable	Correlation	Partial Correlation (Mental age held constant)
Word Pronunciation	.829	.752
Spelling	.669	.485

The significance of the differences of the mean scores of the three grades is reported in Table XXXVIII.

TABLE XXXVIII

COMPARISON OF MEAN SCORES OF GRADES 7, 9, AND 11 ON TEST III

Grades	Means	S.D.	S.E.M	Diff. of Means	S.E. Diff.	C.R.
7	8.61	4.30	.289			
9	10.02	4.10	.305	1.41	.419	3.37
9	10.02	4.10	.305			
11	12.53	2.91	.206	2.51	.367	6.84
7	8.61	4.30	.289			
11	12.53	2.91	.206	3.92	.353	11.10

Growth in ability to blend sounds presented visually is positive and significant between grades 7 and 9, 9 and 11, and 7 and 11.

The reliability coefficient of Test III is .927.

The relationships of the test to spelling and to word pronunciation are summarized in Table XXXIX.

TABLE XXXIX

RELATIONSHIP OF TEST III TO WORD PRONUNCIATION AND SPELLING

Variable	Correlation	Partial Correlation (Mental age held constant)
Word Pronunciation	.829	.752
Spelling	.669	.485

Ability to blend sounds, as measured by Test III, has a high degree of relationship with the practical skill of word pronunciation even when the factor of mental age is held constant. It is less closely related to spelling ability.

Test IV: Spelling from Sound

TABLE XL

COMPARISON OF PERCENTAGES OF CORRECT ANSWERS ON TEST IV OF HIGH TWENTY-FIVE PER CENT AND LOW TWENTY-FIVE PER CENT OF PUPILS

Item	Per Cent Correct High Group N=151	Per Cent Correct Low Group N=151	Difference in Per Cent	S.E. Diff.	C.R.
1	97.4	84.1	13.3	.0331	4.02
2	98.0	85.4	12.6	.0310	4.06
3	99.3	88.1	11.2	.0272	4.12
4	98.7	82.8	15.9	.0320	4.97
5	100.0	93.4	6.6	.0225	2.93
6	95.4	59.6	35.8	.0439	8.15
7	98.7	79.5	19.2	.0339	5.66
8	98.7	71.5	27.2	.0386	7.05
9	100.0	83.4	16.6	.0320	5.19
10	93.4	65.6	27.8	.0443	6.27
11	92.7	58.9	33.8	.0452	7.48
12	94.0	43.0	51.0	.0443	11.51
13	96.0	56.3	39.7	.0431	9.21
14	98.7	66.2	32.5	.0398	8.17
15	88.1	40.4	47.7	.0477	10.00
16	65.6	33.1	32.5	.0545	5.96
17	92.7	51.0	41.7	.0461	9.05
18	95.4	48.3	47.1	.0448	10.51
19	90.1	58.9	31.2	.0466	6.69
20	94.7	59.6	35.1	.0439	7.99
21	96.7	68.9	27.8	.0405	6.86
22	82.8	50.0	32.8	.0514	6.38
23	86.1	50.0	36.1	.0496	7.28
24	90.7	51.0	39.7	.0470	8.45

All items in Test IV discriminate significantly between the high and low groups.

Ability to blend sounds, as measured by Test III, has a high degree of relationship with the practical skill of word pronunciation even when the factor of mental age is held constant. It is less closely related to spelling ability.

Test IV: Spelling from Sound

TABLE XI

COMPARISON OF PERCENTAGES OF CORRECT ANSWERS ON TEST IV OF HIGH TWENTY-FIVE PER CENT AND LOW TWENTY-FIVE PER CENT OF PUPILS

Item	Per Cent Correct High Group N=125	Per Cent Correct Low Group N=125	Difference in Per Cent	S.E. Diff.	C.R.
1	97.4	84.1	13.3	.0321	4.02
2	98.0	85.4	12.6	.0310	4.06
3	99.3	88.1	11.2	.0272	4.12
4	98.7	82.8	15.9	.0390	4.07
5	100.0	93.4	6.6	.0225	2.93
6	95.4	59.6	35.8	.0449	8.15
7	98.7	79.5	19.2	.0329	5.84
8	98.7	71.5	27.2	.0386	7.05
9	100.0	83.4	16.6	.0320	5.19
10	93.4	65.6	27.8	.0443	6.27
11	92.7	58.9	33.8	.0452	7.48
12	94.0	43.0	51.0	.0443	11.51
13	96.0	56.3	39.7	.0431	9.21
14	98.7	66.2	32.5	.0398	8.17
15	88.1	40.4	47.7	.0477	10.00
16	65.6	33.1	32.5	.0445	5.96
17	92.7	51.0	41.7	.0461	9.05
18	95.4	48.3	47.1	.0448	10.51
19	90.1	58.9	31.2	.0466	6.69
20	94.7	59.6	35.1	.0439	7.99
21	96.7	68.9	27.8	.0405	6.86
22	82.8	50.0	32.8	.0514	6.38
23	86.1	50.0	36.1	.0496	7.28
24	90.7	51.0	39.7	.0470	8.45

All items in Test IV discriminate significantly between the high and low groups.

TABLE XLI

FREQUENCY DISTRIBUTION OF TEST IV
Spelling by Sound

Highest possible score = 150

Intervals	Grade 7		Grade 9		Grade 11	
	Boys	Girls	Boys	Girls	Boys	Girls
147 - 151		1			2	1
142 - 146	1	4	6	5	3	18
137 - 141	4	8	9	4	22	24
132 - 136	8	9	14	14	13	18
127 - 131	12	10	21	14	7	20
122 - 126	11	13	10	9	10	9
117 - 121	7	8	4	9	4	12
112 - 116	9	11	10	4	2	7
107 - 111	10	11	11	6	6	5
102 - 106	7	6	3	3	3	2
97 - 101	8	12	2	2	3	3
92 - 96	5	2	5	1	0	1
87 - 91	4	5	2	1	0	1
82 - 86	3	7	1	0	2	
77 - 81	2	4	2	2	1	
72 - 76	4	0	0	2	0	
67 - 71	2	2	0	1	1	
62 - 66	4	2	2			
57 - 61	1		1			
52 - 56	1		1			
47 - 51	1					
42 - 46	1					
37 - 41	1					
Totals	106	115	104	77	79	121
Range	39 - 145	62 - 149	53 - 144	68 - 144	69 - 149	87 - 147
Mean	106.85	112.75	119.20	121.10	126.05	129.30
S.D.	23.65	19.75	19.40	17.15	16.50	12.55

TABLE XII

FREQUENCY DISTRIBUTION OF TEST IV
Spelling by Sound

Highest possible score = 150

Intervals	Grade 7		Grade 9		Grade 11	
	Boys	Girls	Boys	Girls	Boys	Girls
147 - 151		1			2	1
142 - 146	1	4	6	5	5	18
137 - 141	4	8	9	4	22	24
132 - 136	8	9	14	14	13	18
127 - 131	12	10	21	14	7	20
122 - 126	11	13	10	9	10	9
117 - 121	7	8	4	9	4	15
112 - 116	9	11	10	4	2	7
107 - 111	10	11	11	6	6	5
102 - 106	7	6	3	3	3	2
97 - 101	8	12	2	2	3	2
92 - 96	3	2	5	1	0	1
87 - 91	4	3	2	1	0	1
82 - 86	3	7	1	0	2	
77 - 81	2	4	2	2	1	
72 - 76	4	0	0	2	0	
67 - 71	2	2	0	1	1	
62 - 66	4	2	2			
57 - 61	1		1			
52 - 56	1		1			
47 - 51	1					
42 - 46	1					
37 - 41	1					
Totals	105	115	104	77	77	121
Range	39 - 145	42 - 149	53 - 144	62 - 144	69 - 149	87 - 147
Mean	106.85	112.75	119.20	121.10	126.05	129.30
S.D.	23.65	19.75	19.40	17.15	16.50	12.55

The significance of the differences of the mean scores of the three grades is shown in Table XLII.

TABLE XLII

COMPARISON OF MEAN SCORES OF GRADES 7, 9, AND 11 ON TEST IV

Grades	Means	S.D.	$S.E._M$	Diff. of Means	S.E. Diff.	C.R.
7	109.90	21.90	1.473		2.012	5.02
9	120.00	18.45	1.371	10.10		
9	120.00	18.45	1.371		1.705	4.69
11	128.00	14.35	1.014	8.00		
7	109.90	21.90	1.473		1.788	10.12
11	128.00	14.35	1.014	18.10		

Table XLII shows that Test IV is sufficiently sensitive to discriminate well between grades 7 and 9, 9 and 11, and 7 and 11. The differences between the means are all significant at the .01 level.

The coefficient of reliability of Test IV is .934.

The relationships of this test to word pronunciation and to spelling are shown in Table XLIII.

TABLE XLIII

RELATIONSHIP OF TEST IV TO WORD PRONUNCIATION AND SPELLING

Variable	Correlation	Partial Correlation (Mental age held constant)
Word Pronunciation	.839	.757
Spelling	.724	.537

The significance of the differences of the mean scores of the three grades is shown in Table XLII.

TABLE XLII

COMPARISON OF MEAN SCORES OF GRADES 7, 9, AND 11 ON TEST IV

Grades	Means	S.D.	S.E.M	Diff. of Means	S.E. Diff.	C.R.
7	109.90	21.90	1.473			
9	120.00	18.45	1.371	10.10	2.012	5.02
9	120.00	18.45	1.371			
11	128.00	14.35	1.014	8.00	1.705	4.69
7	109.90	21.90	1.473			
11	128.00	14.35	1.014	18.10	1.788	10.12

Table XLII shows that Test IV is sufficiently sensitive to discriminate well between grades 7 and 9, 9 and 11, and 7 and 11. The differences between the means are all significant at the .01 level.

The coefficient of reliability of Test IV is .934.

The relationships of this test to word pronunciation and to spelling are shown in Table XLIII.

TABLE XLIII

RELATIONSHIP OF TEST IV TO WORD PRONUNCIATION AND SPELLING

Variable	Correlation	Partial Correlation (Mental age held constant)
Word Pronunciation	.839	.727
Spelling	.734	.537

Test IV: ability to spell by sound, has a strong degree of relationship with word pronunciation even when the factor of mental age is held constant. The writer did not expect to find it less highly related to spelling. Possibly the lower coefficient of correlation reflects the fact that much of English spelling is non-phonetic. Therefore, ability to hear sounds accurately and to translate them into visual form may have less relationship with the practical act of spelling than one would at first expect.

Test V, Part A: Recognition of Words Presented by Means of a Tachistoscope

TABLE XLIV

COMPARISON OF PERCENTAGES OF CORRECT ANSWERS ON TEST V, PART A OF HIGH TWENTY-FIVE PER CENT AND LOW TWENTY-FIVE PER CENT OF PUPILS

Item	Per Cent Correct High Group N=151	Per Cent Correct Low Group N=151	Difference in Per Cent	S.E. Diff.	C.R.
1	98.7	73.5	25.2	.0369	6.83
2	100.0	77.5	22.5	.0349	6.45
3	100.0	76.8	23.2	.0349	6.65
4	98.7	58.9	39.8	.0408	9.75
5	99.3	82.8	16.5	.0320	5.16
6	99.3	72.2	27.1	.0379	7.15
7	98.0	67.5	30.5	.0396	7.70
8	98.7	61.6	37.1	.0408	9.09
9	98.7	64.2	34.5	.0398	8.67
10	100.0	73.5	26.5	.0369	7.18
11	96.0	45.7	50.3	.0440	11.43
12	98.7	59.6	39.1	.0408	9.58
13	100.0	55.6	44.4	.0408	10.88
14	98.0	46.4	51.6	.0424	12.17
15	96.0	41.1	54.9	.0431	12.74
16	98.0	33.1	64.9	.0396	16.39
17	100.0	60.3	39.7	.0408	9.73
18	95.4	35.1	60.3	.0429	14.05
19	76.2	24.5	51.7	.0495	10.44
20	76.8	23.8	53.0	.0488	10.86

Test IV: ability to spell by sound, has a strong degree of relationship with word pronunciation even when the factor of mental age is held constant. The writer did not expect to find it less highly related to spelling. Possibly the lower coefficient of correlation reflects the fact that much of English spelling is non-phonetic. Therefore, ability to hear sounds accurately and to translate them into visual form may have less relationship with the practical act of spelling than one would at first expect.

Test V, Part A: Recognition of Words Presented by Means of a Tachistoscope

TABLE XLIV

COMPARISON OF PERCENTAGES OF CORRECT ANSWERS ON TEST V, PART A OF HIGH TWENTY-FIVE PER CENT AND LOW TWENTY-FIVE PER CENT OF PUPILS

Item	Per Cent Correct High Group N=127	Per Cent Correct Low Group N=127	Difference in Per Cent	S.E. Diff.	C.R.
1	98.7	73.5	25.2	.0369	6.83
2	100.0	77.5	22.5	.0349	6.45
3	100.0	76.8	23.2	.0349	6.65
4	98.7	58.9	39.8	.0408	9.75
5	99.3	82.8	16.5	.0320	5.16
6	99.3	72.2	27.1	.0379	7.15
7	98.0	67.5	30.5	.0396	7.70
8	98.7	61.6	37.1	.0408	9.09
9	98.7	64.2	34.5	.0398	8.67
10	100.0	73.5	26.5	.0369	7.18
11	96.0	45.7	50.3	.0440	11.43
12	98.7	59.6	39.1	.0408	9.58
13	100.0	55.6	44.4	.0408	10.88
14	96.0	46.4	51.6	.0434	12.17
15	96.0	41.1	54.9	.0431	12.74
16	98.0	33.1	64.9	.0395	16.39
17	100.0	60.3	39.7	.0408	9.73
18	95.4	35.1	60.3	.0429	14.05
19	76.2	24.5	51.7	.0495	10.44
20	76.8	23.8	53.0	.0488	10.86

All items in Test V, Part A, discriminate significantly between the high and low groups.

TABLE XLV

FREQUENCY DISTRIBUTION OF TEST V, PART A
Recognition of Words Presented by Means of a Tachistoscope

Highest possible score = 20

Scores	Grade 7		Grade 9		Grade 11	
	Boys	Girls	Boys	Girls	Boys	Girls
20	4	2	6	8	13	11
19	14	12	22	18	13	23
18	18	19	23	11	9	17
17	13	16	12	11	11	19
16	10	20	16	4	10	13
15	7	12	8	7	7	15
14	10	8	3	6	3	4
13	8	3	2	4	4	4
12	8	10	5	1	3	3
11	3	7	2	2	1	1
10	2	1	1	0	1	2
9	4	3	0	2	2	2
8	1	0	0	0	0	3
7	1	1	0	0	2	1
6	0	0	1	1		1
5	2	0	1	1		1
4	0	0	0	1		0
3	0	0	1			0
2	0	1	1			0
1	1					1
Totals	106	115	104	77	79	121
Range	1 - 20	2 - 20	2 - 20	4 - 20	6 - 20	1 - 20
Mean	15.19	15.44	16.42	16.35	16.51	16.16
S.D.	3.64	3.04	3.35	3.48	3.13	3.48

The distributions of scores of Test V, Part A, all tend to cluster at the top of the range. The test was obviously too easy for the population tested.

All items in Test V, Part A, discriminate significantly between the high and low groups.

TABLE XIV

FREQUENCY DISTRIBUTION OF TEST V, PART A
Recognition of Words Presented by Means of a Tachistoscope

Highest possible score = 20

Scores	Grade 7		Grade 9		Grade 11	
	Boys	Girls	Boys	Girls	Boys	Girls
20	4	2	6	8	13	11
19	14	12	22	18	13	23
18	18	19	23	11	9	17
17	13	16	12	11	11	19
16	10	20	16	4	10	13
15	7	12	8	7	7	15
14	10	8	3	6	3	4
13	8	3	2	4	4	4
12	8	10	5	1	3	2
11	3	7	2	2	1	1
10	2	1	1	0	1	2
9	4	3	0	2	2	2
8	1	0	0	0	0	3
7	1	1	0	0	2	1
6	0	0	1	1		1
5	2	0	1	1		1
4	0	0	0	1		0
3	0	0	1			0
2	0	1	1			0
1	1					1
Totals	106	115	104	77	79	121
Range	1 - 20	2 - 20	2 - 20	4 - 20	6 - 20	1 - 20
Mean	15.19	15.44	16.42	16.35	16.51	16.16
S.D.	3.64	3.04	3.35	3.48	3.13	3.48

The distributions of scores of Test V, Part A, all tend to cluster at the top of the range. The test was obviously too easy for the population tested.

The significance of the differences of the mean scores of the three grades is shown in Table XLVI.

TABLE XLVI

COMPARISON OF MEAN SCORES OF GRADES 7, 9, AND 11 ON TEST V, PART A

Grades	Means	S.D.	$S.E._M$	Diff. of Means	S.E. Diff.	C.R.
7	15.33	3.24	.217			
					.332	3.19
9	16.39	3.39	.251	1.06		
9	16.39	3.39	.251	.10		
					.341	.29
11	16.29	3.38	.231			
7	15.33	3.24	.217			
					.316	3.04
11	16.29	3.38	.231	.96		

The differences between the mean scores of the three grades on Test V, Part A, are very small. In the case of grades 9 and 11, the slight difference is in favor of grade 9. Differences between grades 7 and 9 and between grades 7 and 11 are, however, significant at the .01 level.

The coefficient of reliability of Test V, Part A, is .841.

The relationships of this test to word pronunciation and to spelling are shown in Table XLVII.

The significance of the differences of the mean scores of the three grades is shown in Table XLVI.

TABLE XLVI

COMPARISON OF MEAN SCORES OF GRADES 7, 9, AND 11 ON TEST V, PART A

Grades	Means	S.D.	S.E.M	Diff. of Means	S.E. Diff.	C.R.
7	15.33	3.24	.217			
				.332		3.19
9	16.29	3.39	.251	1.06		
9	16.29	3.39	.251	.10		
					.341	.29
11	16.29	3.38	.231			
7	15.33	3.24	.217			
				.316		3.04
11	16.29	3.38	.231	.96		

The differences between the mean scores of the three grades on Test V, Part A, are very small. In the case of grades 9 and 11, the slight difference is in favor of grade 9. Differences between grades 7 and 9 and between grades 7 and 11 are, however, significant at the .01 level.

The coefficient of reliability of Test V, Part A, is .841.

The relationships of this test to word pronunciation and to spelling are shown in Table XLVII.

TABLE XLVII

RELATIONSHIP OF TEST V, PART A, TO WORD PRONUNCIATION AND SPELLING

Variable	Correlation	Partial Correlation (Mental age held constant)
Word Pronunciation	.243	.143
Spelling	.268	.161

There is apparently very little relationship between performance on this test of visual recognition and either word pronunciation or spelling.

Test V, Part B: Recall of Words Presented by Means of a Tachistoscope

TABLE XLVIII

COMPARISON OF PERCENTAGES OF CORRECT ANSWERS ON TEST V, PART B, OF HIGH TWENTY-FIVE PER CENT AND LOW TWENTY-FIVE PER CENT OF PUPILS

Item	Per Cent Correct High Group N=151	Per Cent Correct Low Group N=181	Difference in Per Cent	S.E. Diff.	C.R.
1	92.7	53.6	39.1	.0461	8.48
2	88.1	50.0	38.1	.0485	7.85
3	95.4	46.4	49.0	.0448	10.94
4	94.7	52.3	42.4	.0448	9.46
5	78.1	28.5	49.6	.0502	9.88
6	98.7	53.0	45.7	.0418	10.93
7	88.1	29.1	59.0	.0452	13.05
8	91.4	31.1	60.3	.0444	13.58
9	84.1	29.1	55.0	.0476	11.55
10	88.1	29.1	59.0	.0452	13.05
11	86.1	23.8	62.3	.0448	13.91
12	64.2	14.6	49.6	.0486	10.21
13	67.5	15.2	52.3	.0478	10.94
14	65.6	12.6	53.0	.0474	11.18
15	85.4	19.9	65.5	.0439	14.92
16	76.8	16.6	60.2	.0460	13.09
17	64.2	9.9	54.3	.0458	11.85
18	54.3	9.9	44.4	.0475	9.35
19	33.8	6.0	27.8	.0434	6.41
20	46.4	10.6	35.8	.0480	7.46

TABLE XLVII

RELATIONSHIP OF TEST V, PART A, TO WORD PRONUNCIATION AND SPELLING

Variable	Correlation	Partial Correlation (Mental age held constant)
Word Pronunciation	.243	.143
Spelling	.268	.161

There is apparently very little relationship between performance on this test of visual recognition and either word pronunciation or spelling.

Test V, Part B: Recall of Words Presented by Means of a Tachistoscope

TABLE XLVIII

COMPARISON OF PERCENTAGES OF CORRECT ANSWERS ON TEST V, PART B, OF HIGH TWENTY-FIVE PER CENT AND LOW TWENTY-FIVE PER CENT OF PUPILS

Item	Per Cent Correct High Group	Per Cent Correct Low Group	Difference in Per Cent	S.E. Diff.	C.R.
1	92.7	53.6	39.1	.0461	8.48
2	88.1	50.0	38.1	.0485	7.85
3	95.4	46.4	49.0	.0448	10.94
4	94.7	52.3	42.4	.0443	9.46
5	78.1	28.5	49.6	.0502	9.88
6	98.7	53.0	45.7	.0418	10.93
7	88.1	29.1	59.0	.0452	13.05
8	91.4	31.1	60.3	.0444	13.58
9	84.1	29.1	55.0	.0476	11.55
10	88.1	29.1	59.0	.0452	13.05
11	86.1	23.8	62.3	.0448	13.91
12	84.2	14.6	69.6	.0386	18.21
13	67.5	15.2	52.3	.0478	10.94
14	65.6	12.6	53.0	.0474	11.18
15	85.4	19.9	65.5	.0439	14.92
16	76.8	16.6	60.2	.0460	13.09
17	64.2	9.9	54.3	.0458	11.85
18	54.3	9.9	44.4	.0475	9.35
19	33.8	6.0	27.8	.0434	6.41
20	46.4	10.6	35.8	.0480	7.46

All items in Test V, Part B, discriminate significantly between the high and low groups.

TABLE XLIX

FREQUENCY DISTRIBUTION OF TEST V, PART B
Recall of Words Presented by Means of a Tachistoscope

Highest possible score = 154

Intervals	Grade 7		Grade 9		Grade 11	
	Boys	Girls	Boys	Girls	Boys	Girls
147 - 153						1
140 - 146			1			1
133 - 139		1	0		1	8
126 - 132	1	0	2	1	1	2
119 - 125	1	0	1	5	1	5
112 - 118	1	5	5	2	8	12
105 - 111	1	2	9	7	10	8
98 - 104	4	3	6	7	12	8
91 - 97	2	5	12	8	9	15
84 - 90	8	12	12	6	4	10
77 - 83	7	8	12	6	5	6
70 - 76	11	11	6	9	4	13
63 - 69	9	12	8	5	10	7
56 - 62	16	14	6	5	2	6
49 - 55	11	12	8	4	1	4
42 - 48	10	13	4	3	1	2
35 - 41	3	6	5	2	1	4
28 - 34	6	3	3	3	5	2
21 - 27	5	0	0	0	1	1
14 - 20	3	4	1	2	1	2
7 - 13	3	2	0	2	2	2
0 - 6	4	2	3			2
Totals	106	115	104	77	79	121
Range	2 - 129	6 - 135	1 -142	9 - 127	0 - 134	1 - 151
Mean	58.51	64.60	77.27	78.39	83.71	86.16
S.D.	26.67	25.69	28.07	28.56	29.05	31.57

This subtest, unlike Test V, Part A, which is also a visual test, is sufficiently difficult for the population tested. There was a small amount

All items in Test V, Part B, discriminate significantly between the high and low groups.

TABLE XLIX

FREQUENCY DISTRIBUTION OF TEST V, PART B
Recall of Words Presented by Means of a Tachistoscope

Highest possible score = 154

Intervals	Grade 7		Grade 9		Grade 11	
	Boys	Girls	Boys	Girls	Boys	Girls
147 - 153						1
140 - 146			1			1
133 - 139		1	0		1	8
126 - 132	1	0	2	1	1	2
119 - 125	1	0	1	5	1	5
112 - 118	1	5	5	2	8	12
105 - 111	1	2	9	7	10	8
98 - 104	4	3	6	7	12	8
91 - 97	2	5	12	8	9	15
84 - 90	8	12	12	5	4	10
77 - 83	7	8	12	6	5	5
70 - 76	11	11	6	9	4	13
63 - 69	9	12	8	5	10	7
56 - 62	16	14	6	5	2	6
49 - 55	11	12	8	4	1	4
42 - 48	10	13	4	3	1	2
35 - 41	3	6	5	2	1	4
28 - 34	6	3	3	3	5	2
21 - 27	5	0	0	0	1	1
14 - 20	3	4	1	2	1	2
7 - 13	3	2	0	2	2	2
0 - 6	4	2	3			2
Totals	106	115	104	77	79	121
Range	2 - 129	6 - 135	1 - 142	9 - 127	0 - 134	1 - 151
Mean	58.91	64.60	77.27	78.39	83.71	86.16
S.D.	24.67	25.69	28.07	28.56	29.05	31.57

This subtest, unlike Test V, Part A, which is also a visual test, is sufficiently difficult for the population tested. There was a small amount

of ceiling even for the very best students in the group.

The significance of the differences between the mean scores of grades 7 and 9, 9 and 11, and 7 and 11 are shown in Table L.

TABLE L

COMPARISON OF MEAN SCORES OF GRADES 7, 9, AND 11 ON TEST V, PART B

Grades	Means	S.D.	$S.E._M$	Diff. of Means	S.E. Diff.	C.R.
7	61.66	26.39	1.775		2.751	5.83
9	77.69	28.28	2.102	16.03		
9	77.69	28.28	2.102		3.041	2.46
11	85.18	31.08	2.198	7.49		
7	61.66	26.39	1.775		2.825	8.33
11	85.18	31.08	2.198	23.52		

The critical ratios in Table L indicate significant growth in visual recall of words presented by means of a tachistoscope, as measured by Test V, Part B, between grades 7 and 9 and grades 7 and 11. The growth between grades 9 and 11 is too small to be significant at the .01 level.

The coefficient of reliability of Test V, Part B, is .918.

The relationships of Test V, Part B, to word pronunciation and spelling are shown in Table LI.

of ceiling even for the very best readers in the group.

The significance of the differences between the mean scores of grades 7 and 9, 9 and 11, and 7 and 11 are shown in Table I.

TABLE I

COMPARISON OF MEAN SCORES OF GRADES 7, 9, AND 11 ON TEST V, PART B

Grades	Means	S.D.	S.E.M	Diff. of Means	S.E. Diff.	C.R.
7	61.65	26.39	1.775			
					2.751	5.89
9	77.69	28.28	2.102	16.03		
9	77.69	28.28	2.102			
					3.041	2.46
11	85.18	31.08	2.198	7.49		
7	61.65	26.39	1.775			
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11	85.18	31.08	2.198	23.52		

The critical ratios in Table I indicate significant growth in visual recall of words presented by means of a tachistoscope, as measured by Test V, Part B, between grades 7 and 9 and grades 7 and 11. The growth between grades 9 and 11 is too small to be significant at the .01 level.

The coefficient of reliability of Test V, Part B, is .918.

The relationships of Test V, Part B, to word pronunciation and spelling are shown in Table II.

TABLE LI

RELATIONSHIP OF TEST V, PART B, TO WORD PRONUNCIATION AND SPELLING

Variable	Correlation	Partial Correlation (Mental age held constant)
Word Pronunciation	.467	.263
Spelling	.525	.301

The relationships of performance on this test of visual recall to word recognition and spelling are slightly higher than the corresponding relationships of visual recognition to the same two factors. However, they are still low.

Relationship of Word Analysis Test to Reading

A less detailed study was made of the relationship of the word analysis test to the various parts of the Cooperative Reading Comprehension Test. It seemed that the direct effect of word analysis ability, or the lack of it, would be apparent in word pronunciation and spelling rather than in knowledge of the meanings of words, in speed, and in comprehension as measured by the Cooperative test.

Coefficients of correlation were, however, computed to show the relationships of the total auditory score and the total visual score with each part of the Cooperative test. The results are reported in Table LII. For purposes of comparison, the coefficients of correlation of the total auditory score and total visual score with word pronunciation and spelling are added to the table.

TABLE LI

RELATIONSHIP OF TEST V, PART B, TO WORD PRONUNCIATION AND SPELLING

Variable	Correlation	Partial Correlation (Mental age held constant)
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Spelling	.525	.321

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Coefficients of correlation were, however, computed to show the relationships of the total auditory score and the total visual score with each part of the Cooperative test. The results are reported in Table LII. For purposes of comparison, the coefficients of correlation of the total auditory score and total visual score with word pronunciation and spelling are added to the table.

TABLE LII

RELATIONSHIP OF TOTAL AUDITORY AND TOTAL VISUAL SCORES TO READING, WORD PRONUNCIATION, AND SPELLING

	Total Auditory Score	Total Visual Score
Reading:		
Vocabulary	.614	.381
Speed	.601	.439
Comprehension	.536	.422
Word Pronunciation	.887	.440
Spelling	.801	.509

Table LII shows a marked relationship of the total auditory scores (Test I, Part A, II, III, IV) to the results of a standardized reading test administered to the same population. The relationship is even more marked with word pronunciation and spelling. The relationships of the total visual score (Test VI, Parts A and B) are much less close.

Sex Differences in Word Analysis Abilities

In order to determine whether there is a real difference between the ability of boys and of girls in word analysis skills as measured by the test, a study was made of the significance of the differences between the means of boys and of girls on each of the subtests. The results of this study are summarized in the following three tables.

TABLE III

RELATIONSHIP OF TOTAL AUDITORY AND TOTAL VISUAL SCORES TO READING, WORD PRONUNCIATION, AND SPELLING

	Total Auditory Score	Total Visual Score
Reading:		
Vocabulary	.614	.321
Speed	.601	.433
Comprehension	.536	.422
Word Pronunciation	.857	.440
Spelling	.801	.309

Table III shows a marked relationship of the total auditory scores (Test I, Part A, II, III, IV) to the results of a standardized reading test administered to the same population. The relationship is even more marked with word pronunciation and spelling. The relationships of the total visual score (Test VI, Parts A and B) are much less close.

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TABLE LIII

COMPARISON OF MEAN SCORES OF BOYS AND GIRLS
Grade Seven

Tests	Sex	Means	S.D.	$S.E._M$	Diff. of Means	S.E. Diff.	C.R.
I Part A	Boys	77.66	13.39	1.301		1.654	2.219
	Girls	81.33	10.95	1.021	3.67		
II	Boys	6.61	2.47	.240		.349	1.003
	Girls	6.96	2.71	.253	.35		
III	Boys	8.06	4.28	.416		.573	1.850
	Girls	9.12	4.24	.395	1.06		
IV	Boys	106.85	23.65	2.297		2.967	1.989
	Girls	112.75	19.75	1.842	5.90		
V Part A	Boys	15.19	3.64	.353		.453	.551
	Girls	15.44	3.04	.283	.25		
V Part B	Boys	58.51	26.67	2.591		3.528	1.726
	Girls	64.60	25.69	2.395	6.09		

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COMPARISON OF MEAN SCORES OF BOYS AND GIRLS
Grade Seven

Tests	Sex	Means	S.D.	S.E.M	Diff. of Means	S.E. Diff.	C.R.
I Part A	Boys	77.66	13.39	1.301	3.67	1.654	2.219
	Girls	81.33	10.95	1.021			
II	Boys	6.61	2.47	.240	.35	.349	1.003
	Girls	6.96	2.71	.253			
III	Boys	8.06	4.28	.416	1.06	.573	1.850
	Girls	9.12	4.24	.395			
IV	Boys	106.85	23.65	2.297	5.90	2.967	1.989
	Girls	112.75	19.75	1.842			
V Part A	Boys	15.19	3.64	.359	.25	.453	.551
	Girls	15.44	3.06	.283			
V Part B	Boys	58.51	26.67	2.591	6.09	3.522	1.726
	Girls	64.60	25.69	2.395			

TABLE LIV

COMPARISON OF MEAN SCORES OF BOYS AND GIRLS
Grade Nine

Tests	Sex	Means	S.D.	$S.E._M$	Diff. of Means	S.E. Diff.	C.R.
I Part A	Boys	82.92	14.71	1.442		1.939	2.785
	Girls	88.32	11.37	1.296	5.40		
II	Boys	6.75	2.57	.252		.363	2.645
	Girls	7.71	2.29	.261	.96		
III	Boys	9.60	4.28	.420		.626	1.598
	Girls	10.60	4.07	.464	1.00		
IV	Boys	119.20	19.40	1.902		2.747	.692
	Girls	121.10	17.15	1.954	1.90		
V Part A	Boys	16.42	3.35	.328	.07	.513	.136
	Girls	16.35	3.48	.396			
V Part B	Boys	77.27	28.07	2.262		3.964	.283
	Girls	78.39	28.56	3.255	1.12		

TABLE LIV

COMPARISON OF MEAN SCORES OF BOYS AND GIRLS
Grade Nine

Tests	Sex	Means	S.D.	S.E.M	Diff. of Means	S.E. Diff.	C.R.
I Part A	Boys	82.92	14.71	1.412		1.939	2.785
	Girls	88.32	11.37	1.296	5.40		
II	Boys	6.75	2.57	.252		.363	2.645
	Girls	7.71	2.59	.261	.96		
III	Boys	9.60	4.28	.420		.626	1.598
	Girls	10.60	4.07	.464	1.00		
IV	Boys	119.20	19.40	1.902		2.747	.692
	Girls	121.10	17.15	1.954	1.90		
V Part A	Boys	16.42	3.35	.328	.07	.513	.136
	Girls	16.35	3.48	.396			
V Part B	Boys	77.27	28.07	2.262		3.964	.289
	Girls	76.39	26.56	2.255	1.12		

TABLE LV

COMPARISON OF MEAN SCORES OF BOYS AND GIRLS
Grade Eleven

Tests	Sex	Means	S.D.	$S.E._M$	Diff. of Means	S.E. Diff.	C.R.
I Part A	Boys	90.45	11.82	1.330		1.606	2.260
	Girls	94.08	9.90	.900	3.63		
II	Boys	7.10	2.51	.282		.333	2.342
	Girls	7.88	1.95	.177	.78		
III	Boys	12.23	2.99	.325		.414	1.232
	Girls	12.74	2.83	.257	.51		
IV	Boys	126.05	16.50	1.856		2.178	1.492
	Girls	129.30	12.55	1.141	3.25		
V Part A	Boys	16.51	3.13	.352	.35	.473	.740
	Girls	16.16	3.48	.316			
V Part B	Boys	83.71	29.05	3.268		4.348	.563
	Girls	86.16	31.57	2.870	2.45		

TABLE IV

COMPARISON OF MEAN SCORES OF BOYS AND GIRLS
Grade Eleven

Tests	Sex	Means	S.D.	S.E.M.	Diff. of Means	S.E. Diff.	C.R.
I Part A	Boys	90.45	11.82	1.330			
	Girls	94.08	9.90	.900	3.63	1.606	2.260
II	Boys	7.10	2.51	.282			
	Girls	7.88	1.95	.177	.78	.333	2.342
III	Boys	12.23	2.99	.325			
	Girls	12.74	2.83	.257	.51	.414	1.232
IV	Boys	126.05	16.50	1.856			
	Girls	129.30	12.55	1.141	3.25	2.176	1.492
V Part A	Boys	16.51	3.13	.352	.35		
	Girls	16.16	3.48	.316		.473	.740
V Part B	Boys	83.71	29.05	3.268			
	Girls	86.16	31.57	2.870	2.45	4.348	.563

The difference between the means of boys and girls is in favor of the girls on all tests and at all three grade levels with the exception of Test V, Part A: Visual Recognition of Words Presented by Means of a Tachistoscope. Grade 9 and 11 boys performed slightly better than the girls in these grades on this test.

Critical ratios to indicate the significance of the differences in the means were computed. Results show that the differences are significant in the following cases.

At the .01 level		At the .05 level	
Grade	Test	Grade	Test
9	Test I, Part A	7	Test I, Part A
9	Test II	7	Test IV
		11	Test I, Part A
		11	Test II

None of the critical ratios are very large, and in more than half of the cases no significant sex differences are revealed.

Interrelationships of the Subtests

It seemed important to investigate to what extent the various subtests of the word analysis battery were measuring the same abilities. Therefore, coefficients of correlation of the various subtests with each other were computed. These correlations are reported in the following summary table.

Boston University
School of Education
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		11	Test II

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Library

TABLE LVI

INTERCORRELATION COEFFICIENTS OF THE SUBTESTS IN THE WORD ANALYSIS BATTERY

	Test II	Test III	Test IV	Test V Part A	Test V Part B
Test I, Part A Sounds in all Positions	.372	.757	.738	.317	.498
Test II Recognition of Syllables		.375	.344	.034	.189
Test III Blending			.780	.283	.456
Test IV Spelling by Sound				.268	.427
Test V, Part A Visual Recognition					.713

Most of the coefficients of correlation of the subtests with each other are low enough to suggest that the tests are measuring different, though related abilities. As would be expected, the two tests of visual perception, Test V, Parts A and B, have a high positive relationship indicated by a coefficient of correlation of .713. Also, the test of auditory recognition of sounds in all positions has a high positive relationship to both Test III, blending, and Test IV, spelling by sound.

A coefficient of correlation was computed between the total auditory score (Tests I, Part A, II, III, IV) and the total visual score (Test V, Parts A and B). This coefficient is .489.

TABLE LVI

INTERCORRELATION COEFFICIENTS OF THE SUBTESTS IN THE SOUND ANALYSIS BATTERY

	Test II	Test III	Test IV	Test V Part A	Test V Part B
Test I, Part A Sounds in all Positions	.372	.757	.738	.317	.490
Test II Recognition of Syllables		.375	.344	.034	.189
Test III Blending			.730	.383	.459
Test IV Spelling by Sound				.383	.427
Test V, Part A Visual Recognition					.712

Most of the coefficients of correlation of the subtests with each other are low enough to suggest that the tests are measuring different, though related abilities. As would be expected, the two tests of visual perception, Test V, Parts A and B, have a high positive relationship indicated by a coefficient of correlation of .712. Also, the test of auditory recognition of sounds in all positions has a high positive relationship to both Test III, blending, and Test IV, spelling by sound.

A coefficient of correlation was computed between the total auditory score (Tests I, Part A, II, III, IV) and the total visual score (Test V, Parts A and B). This coefficient is .489.

Summary Tables

The following tables repeat information already given in preceding tables. It is brought together in summary form for convenience of comparison.

TABLE LVII

SUMMARY OF COEFFICIENTS OF RELIABILITY
(Corrected by Spearman-Brown formula)

Test	Coefficient
Test I, Part A: Auditory Recognition of Sounds in all Positions	.923
Test II: Auditory Recognition of Syllables	.817
Test III: Blending Sounds Presented Visually	.927
Test IV: Spelling by Sound	.934
Test V, Part A: Recognition of Words Presented by Means of a Tachistoscope	.841
Test V, Part B: Recall of Words Presented by Means of a Tachistoscope	.918

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TABLE LVII

SUMMARY OF COEFFICIENTS OF RELIABILITY
(Corrected by Spearman-Brown formula)

Test	Coefficient
Test I, Part A: Auditory Recognition of Sounds in all Positions	.929
Test II: Auditory Recognition of Syllables	.817
Test III: Blending Sounds Presented Visually	.927
Test IV: Spelling by Sound	.934
Test V, Part A: Recognition of Words Presented by Means of a Tachistoscope	.841
Test V, Part B: Recall of Words Presented by Means of a Tachistoscope	.918

TABLE LVIII

SUMMARY OF CORRELATIONS WITH WORD PRONUNCIATION AND SPELLING

Tests	Correlations		Partial Correlations (Mental Age Held Constant)	
	Word Pronunciation	Spelling	Word Pronunciation	Spelling
Test I, Part A	.813	.754	.712	.568
Test II	.397	.357	.290	.221
Test III	.829	.669	.752	.485
Test IV	.839	.724	.757	.537
Test V, Part A	.243	.268	.143	.161
Test V, Part B	.467	.525	.263	.301

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Test V, Part A	.243	.269	.143	.161
Test V, Part B	.467	.525	.263	.301

CHAPTER VI

SUMMARY AND CONCLUSIONS

The first purpose of this study was to construct and evaluate a test of certain word analysis abilities for junior-senior high school pupils. The word analysis abilities included in the test were: (1) auditory recognition of sounds in all positions; (2) auditory recognition of vowel sounds; (3) auditory recognition of syllables; (4) blending sounds presented visually; (5) spelling by sound; (6) visual recognition of words presented by means of a tachistoscope; and (7) visual recall of words presented by means of a tachistoscope.

The second purpose of the study was to investigate the degree to which these skills are possessed by a representative group of pupils in grades seven, nine, and eleven. The relationships of the skills, as measured by the test constructed, to performance in reading and spelling were also studied.

Twenty-one very brief tests of several different types were constructed and administered to a small seventh grade population. Evaluation of the results of this preliminary study led to the writing of another series of seven tests, each designed to measure one of the seven abilities listed in the first paragraph of this chapter.

These tests were administered to a population of 602 pupils in grades seven, nine, and eleven. These same pupils were given the Otis Quick-Scoring Mental Ability Test, the Cooperative Reading Comprehension Test C1T,

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These tests were administered to a population of 602 pupils in grades seven, nine, and eleven. These same pupils were given the Otis Quick-Scoring Mental Ability Test, the Cooperative Reading Comprehension Test Cuf,

and a spelling test. An individually administered word pronunciation test was given to 121 of these pupils.

After the frequency distributions of the word analysis tests had been made, the test measuring auditory recognition of vowel sounds (Test I, Part B) was eliminated from further statistical study because it proved to be unsuited to the population tested. All other tests were studied to determine:

-- the degree to which each item differentiates between high and low achievers in the particular skill measured by the test

-- the central tendency and variability of the scores

-- the reliability of the test

-- the significance of the differences between the means of the three grade levels

-- the relationships of performance on the test to performance on tests of word pronunciation and spelling

In addition, a study was made of the following:

-- relationships of the combined score of all auditory tests and of the combined score of the two visual tests to vocabulary, speed, and comprehension scores on the standardized test of reading ability

-- the significance of the differences in the means of boys and girls on the various word analysis tests

-- the intercorrelations of the various word analysis tests

-- the correlation of the total auditory score with the total visual score.

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-- the central tendency and variability of the scores
-- the reliability of the test
-- the significance of the differences between the means of the three grade levels
-- the relationships of performance on the test to performance on tests of word pronunciation and spelling

In addition, a study was made of the following:

-- relationships of the combined score of all auditory tests and of the combined score of the two visual tests to vocabulary, speed, and comprehension scores on the standardized test of reading ability
-- the significance of the differences in the means of boys and girls on the various word analysis tests
-- the intercorrelations of the various word analysis tests
-- the correlation of the total auditory score with the total visual score.

The following conclusions were drawn from the analysis of data:

1. All items of all tests except items 7 and 24 of the test of auditory recognition of sounds in all positions discriminate significantly, most of them very significantly, between high and low achievers. The scores of high achievers are generally very high. This fact would tend to make the tests unsuitable for administration to a total school population, However, for the diagnostic purposes for which the tests are designed the fact that they have little or no ceiling for good readers is not necessarily important.
2. This study indicates that there is significant growth in the skills of auditory recognition of sounds in all positions, blending sounds presented visually, and spelling by sound between grades 7 and 9, 9 and 11, and 7 and 11. All critical ratios are significant at the .01 level. Growth occurs in the skill of auditory recognition of syllables, but the critical ratio indicates that it is significant only between grades 7 and 11. Critical ratios significant at the .01 level indicate growth in the skill of visual recognition as measured by Test V, Part A, between grades 7 and 9, and 7 and 11. However, the mean of grade 9 is slightly higher than the mean of grade 11 and the very small critical ratio is in favor of grade 9. In visual recall (Test V, Part B) the significance of growth between grades 7 and 9 is represented by a critical ratio of 5.83; between 7 and 11 by a ratio of 8.33. However, the significance of the difference between grades 9 and 11 is represented by a critical ratio of

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only 2.46 and so falls below the .01 level. It may be concluded that significant growth in the auditory skills does take place except in auditory recognition of syllables. In both visual recognition and visual recall this particular eleventh grade group failed to show significant progress beyond the level of the ninth grade group. Since most of these skills probably receive little or no attention in the teaching of reading beyond grade 6, it is likely that what growth is evident is the result of incidental learning.

3. All tests have reliability coefficients, computed by the split-half method and estimated for the whole test by use of the Spearman-Brown formula, above .90 except Test II and Test V, Part A. Test II, with only ten items, is probably too short to be very reliable.

4. In determining the validity of a test, it is usually necessary to find its relationship to some independent criteria. It seemed, in this case, that the best criteria were actual performance in word pronunciation and spelling. Correlation coefficients and partial correlation coefficients, with mental age held constant, both show that auditory recognition of sounds in all positions, blending of sounds presented visually, and spelling from sound have high positive relationships with word pronunciation. The correlations of these same tests with spelling show a considerable degree of relationship, though less than with word pronunciation. The relationships of auditory recognition of syllables and of both visual recognition and visual recall

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to word pronunciation and spelling are positive but low.

5. The total auditory score has marked relationships to vocabulary ($r = .614$), speed ($r = .601$) and comprehension ($r = .536$) as measured by a standardized reading test. Relationships of the total visual score to these same three factors are much less marked. Corresponding coefficients are .381, .439, and .422.
6. Sex differences are all slightly in favor of the girls except in the case of visual recognition, where ninth and eleventh grade boys have a slightly higher mean score than the girls. Differences are significant at the .01 level only in the performance of grade 9 girls on tests of auditory recognition of sounds in all positions and auditory recognition of syllables.
7. Intercorrelation coefficients indicate, as would be expected, a high degree of relationship of visual recognition and visual recall. Other tests showing high interrelationships are tests of auditory recognition of sounds in all positions, blending and spelling by sound. The relationship of the total auditory to the total visual score is represented by a coefficient of correlation of .489. It is apparent that the various tests are measuring different but in some cases closely related functions. The relationships are probably not high enough to suggest that any one of the tests could be used alone as a diagnostic instrument.
8. In the partial correlation study, mental age held constant, all coefficients were smaller than the corresponding Pearson product-moment coefficients. However, the partial correlation coefficients

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indicate clearly that the tests are not functioning primarily as intelligence tests.

9. The word analysis skills measured by the various tests are more closely related to performance in word pronunciation than to performance in spelling, at least as tested by the instruments used in this study. This finding seems to be in contrast to the findings of some earlier studies.

The writer would like to conclude this statement by making the following general observations:

-- Phonetic and structural analysis, separately or in combination, are not the only methods of word attack which children learn. Many pupils develop techniques in the use of context and other clues which are often very effective. No perfect correlation between performance in any tests of word analysis and success in either reading or spelling would be expected. Since this is true, some of the relationships shown in this study may be considered substantial.

-- At the secondary level, more advanced skills of structural analysis may be more important in differentiating between good and poor spellers and readers than are the simpler skills measured by these tests. Just as studies previously cited have indicated the changing relative importance of the various skills in the intermediate grades as compared with the primary grades, it may be that a still quite different order of skills is important in the secondary school.

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Suggestions for Further Research

It would seem that the next step in further research should be another revision of some parts of the total test and a restudy of the results with another population. If the test were to be only one part of a diagnostic battery, it would be well to reduce its length to thirty minutes or less if this is possible without lowering the reliability. The writer would suggest the following content for a revised version:

Tests	Reasons for Including
Test I, Part A: Auditory recognition of sounds in all positions. The non-discriminating items, 7 and 24, should be omitted.	Correlation coefficients: Word recognition r = .813 Spelling r = .754 Reliability r = .923 Significance of differences in mean scores: Grades 7 and 9 C. R. = 4.53 Grades 9 and 11 C. R. = 5.90
Test III: Blending sounds presented visually	Correlation coefficients: Word recognition r = .829 Spelling r = .669 Reliability r = .927 Significance of differences in mean scores: Grades 7 and 9 C. R. = 3.37 Grades 9 and 11 C. R. = 6.84

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Test IV: Spelling from sound	Correlation coefficients:
	Word recognition r = .839
	Spelling r = .724
	Reliability r = .934
	Significance of differences in mean scores:
	Grade 7 and 9 C. R. = 5.02
	Grade 9 and 11 C. R. = 4.69
A new visual test	To be constructed

Neither of the visual tests used in the present study has a high relationship with either word pronunciation or spelling. Perhaps visual recognition and recall are not significantly related to word pronunciation and spelling at the secondary level. However, as was pointed out in Chapter II, some writers have found visual perception even more important, especially to the spelling of a non-phonetic language like English, than auditory perception. It would seem desirable to measure these visual skills again with a different test. Possibly the unusual method of presentation with the handmade tachistoscope was ineffective. Although hand manipulation of flashcards is slow compared with a tachistoscope, it might be more satisfactory. Perhaps the tachistoscope moved so fast that the tests emphasized speed more than accuracy.

A second outgrowth of the present study could well be the building of a test to measure the more advanced structural analysis skills. Such a test might be more generally useful than the present test which is suitable only for diagnostic purposes with retarded readers.

Test IV: Spelling from sound — Correlation coefficients:

Word recognition r = .639

Spelling r = .724

Reliability r = .934

Significance of difference in mean scores:

Grade 7 and 9 C. R. = 5.02

Grade 9 and 12 C. R. = 1.69

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A third type of study would be one in which a pairing technique or partial correlation procedure would make it possible to determine the relative importance to reading and spelling at the secondary level of the various word analysis skills.

A fourth step should be a series of studies with different kinds of teaching materials and devices to determine to what extent high school pupils can improve their word analysis skills and what effect, if any, such improvement would haveon their reading and spelling. Because we know that some of these skills are significantly related to reading and spelling ability, it does not necessarily follow that training in the skills will improve reading and spelling. That is yet to be proved.

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APPENDIX A

MATERIALS USED IN PRELIMINARY STUDY

DISTRIBUTIONS OF PRELIMINARY TEST SCORES

WORD ANALYSIS TEST
for
JUNIOR-SENIOR HIGH SCHOOL

Name ..... Date .....

School ..... City or town .....

Age ..... Birthday ..... Grade ..... Boy Girl
(month) (day)

Do you have any trouble in seeing the blackboard? Yes No

Do you have any trouble in hearing people speak? Yes No

Directions to Pupils: The following pages contain several exercises which are intended to measure your ability to hear sounds accurately and to see combinations of letters rapidly and correctly.

Most of the words used in the exercises are real words. Many of them, however, you will not have heard before. Do not be disturbed by this fact. Remember that the exercises are intended to measure your ability to hear and to see. The fact that the meanings are not known to you will not affect your score in any way.

Listen carefully to directions and follow them exactly.

Do not turn the page until you are told to do so.

Sample Exercises:

Sample 1 : fox sun ring box pinch

Sample 2 : mast clasp hard band worm

Sample 3 : hit met ham mud hot

Sample 4 : likely forty dreaded fashion fancy

	Scores		Scores
Test I - Auditory Discrimination		Test III - Auditory Analysis into Syllables	
Part A		Test IV - Visual Analysis into Syllables	
Part B			
Part C		Test V - Spelling by Sound	
Part D		Test VI - Visual Discrimination	
Part E			
Part F		Part A	
Part G		Part B	
Part H		Part C	
Part I		Part D	
Part J		Part E	
Test II - Blending		Part F	
Part A			
Part B		Total Score	

TEST I

Part A

Directions: Circle the word that BEGINS with the same sound as the words you hear.

1. find pond vine come war
2. nose met rim house pack
3. cat rose find hard lick
4. pin hen duck line yarn
5. darn goose barn time hook

Part B

Directions: Circle the word that BEGINS with the same two sounds as the words you hear.

1. swim spin sent zero stain
2. peg glimpse bump blood plan
3. pig from pray bread train
4. plum brag frog glad trick
5. trip brine glad play twine

Part C

Directions: Circle the word that ENDS with the same sound as the words you hear.

1. feet mind work full peep

2. mill fur cup coin pick

3. hum hope soil fun car

4. mat cup hole rub pig

5. neck date pin cuff rip

Part D

Directions: Circle the word that ENDS with the same two sounds as the words you hear.

1. clasp card held cast prism

2. limp camp hurt link mint

3. couple noble cupful nickel curl

4. fork arch hurt talk hard

5. part called mark board curb

Part E

Directions: Circle the word that contains ANYWHERE WITHIN IT the same sound that is at the beginnings of the words you hear.

1.	lumber	pillow	neglect	sapling	pantry
2.	muscle	pocket	mushroom	richer	trifle
3.	legal	racket	better	maiden	motion
4.	little	nickel	badly	cabin	river
5.	behave	belief	motion	person	gift

Part F

Directions: In this exercise you have lists of sounds. Circle all the sounds in each list that you hear in the word I pronounce.

Samples:	p	b	a	e	d
	l	a	n	m	p
1.	t	f	a	l	p
2.	l	i	m	n	k
3.	m	o	t	s	r
4.	n	a	j	f	p
5.	p	b	w	s	e
6.	a	p	w	t	r
7.	d	f	i	b	v
8.	m	f	l	i	n

9.	p	r	m	a	t
10.	k	e	v	i	m
11.	b	e	v	f	z
12.	d	n	u	p	r
13.	w	i	m	r	a
14.	l	f	n	b	k
15.	h	p	o	z	m

Part G

Directions: Circle the word that contains the same VOWEL sound as the words you hear. The vowels are a, e, i, o, u.

1.	fan	fish	fond	fell	fun
2.	bill	bat	bet	bug	bog
3.	run	rim	bat	rot	red
4.	sock	sap	sin	suck	sell
5.	man	men	mit	mop	muff
6.	till	tan	top	tub	ten

Part H

Directions: Circle the word that BEGINS with the same syllable as the words you hear.

1. propose perfect prepare patience pupil

2. divide depart behave people family

3. uncle improper umbrella ankle index

4. fondly connect kindle comma cotton

5. absent educate apple honest admit

Part I

Directions: Circle the word that ENDS with the same syllable was the words you hear.

1. reason penguin human motive portion

2. tonight locate liquid became recite

3. notice receive native income behave

4. lovely story delay happy buy

5. helpless human lovable places generous

Part J

Directions: Circle the word which is EXACTLY the same as the word you hear.

1. bristly brisket prismatic thicket fiscal

2. palimpsest pellitory balderdash deliquesce palindrome

3. retroject matricula curriculum reticulin reticulum

4. metabasis metabolic matelassé catabasis nettlewort

5. dissimulation dissimilitude verisimilitude bismutite resupination

TEST II

Part A

Directions: Circle the word that would result if the sounds you hear were blended into one word.

Sample: nate nide nah nog mids

1. thilk shilp shirl chirl shilf
2. hulk bols pust dulse drus
3. privet prifle drifet tevip prafit
4. enlept enrapt inrage unpart enrist
5. faply batby dotsy pasfy botfly

Part B

Directions: Blend each series of sounds into a word. Write the word which you make from each series. A mark like this ¯ indicates a long vowel. A mark like this ˘ is a sign of a short vowel. A mark like this ´ shows where the accent is placed.

Sample: n ī t _____

1. p ē s _____
2. ĕ j _____
3. k ă c h _____
4. k w ĕ´ s c h ŭ n _____
5. k r ĭ´ s´ m ŭ´ s _____
6. ĕ k s p r ĕ´ s´ _____
7. p ā´ s h ĕ n s _____
8. r ī t _____

TEST III

Directions: As each word is pronounced, listen for the NUMBER of syllables you hear. Circle the figure which represents the number of syllables in the word.

Sample: 1 2 3 4 5 6 7 8

1. 1 2 3 4 5 6 7 8
2. 1 2 3 4 5 6 7 8
3. 1 2 3 4 5 6 7 8
4. 1 2 3 4 5 6 7 8
5. 1 2 3 4 5 6 7 8

TEST IV

Directions: Draw a slanting line between the syllables in each of the following words.

Sample: mesmerism

1. insensate
2. palliation
3. tweak
4. irrepealable
5. hydriodide

TEST V

Directions: The words which you will hear may be spelled correctly if you will write the exact sounds which you hear and NO other sounds. Listen carefully. Each word will be pronounced twice.

Sample: _____

1. _____
2. _____
3. _____
4. _____
5. _____

TEST VI

Sample 1 : fish cash with mush wish

Sample 2 : regiment argument regular rejoice installment

Sample 3 : candle handy cannot candy caddy

Sample 4 : diligent different biscuit difficult finished

Sample 5 : passage pessimistic transport passport perfection

Sample 6 : rocket sachet rocker rococo rodent

Sample 7 : fluffy plunge pump plural plump

Sample 8 : mechanism mechanical negligent medalist retirement

Sample 9 : _____

Sample 10: _____

Part A

Directions: One of the five words in each line will be flashed just once. Watch carefully and circle the word which you see.

1. there where them this here

2. within without lockout hideout withdrew

3. paradise perpetrate cyanide brominate paramide

4. legatary legendary legative profanatory disclamatory

5. telephotograph teleology telegraphist microphotograph phonographical

Part B

Directions: One of the five words in each line will be flashed just once. Watch carefully and circle the word which you see.

1. hand first find tend fist

2. decide devise advice novice device

3. frankincense fraternize paternalism polymerize fraternalism

4. interaxis interactive innocuous enterate anorexia

5. illuminant illaqueate illuminati indissoluble ollapodrida

Part C

Directions: One of the five words in each line will be flashed just once. Watch carefully and circle the word which you see.

1. soft soon lift sift soap

2. hearten heckle buckle trouble hectic

3. figurine picoline filigree bagatelle figurative

4. personator personable imperator perspective delineator

5. suppletory satisfactory rogatory supplicatory supplement

Part D

Directions: Watch carefully while some words are flashed. Each word will be flashed just once. Write the word exactly as you see it.

1. _____

2. _____

3. _____

4. _____

5. _____

Part E

Directions: Watch carefully while some words are flashed. Each word will be flashed only once. Write the word which you saw.

1. _____

2. _____

3. _____

4. _____

5. _____

Part F

Directions: Watch carefully while some words are flashed. Each word will be flashed just once. Write the word which you saw.

1. _____

2. _____

3. _____

4. _____

5. _____

WORD ANALYSIS TEST
for
JUNIOR-SENIOR HIGH SCHOOL

Directions for Administering

Pass out the test booklets with instructions not to open them until the signal is given.

Say: "In the space at the top of the page write your last name and then your first name. Write today's date (give it). Write the name of your school and the name of your city or town. Write your age in the next space. Then write the month and day of your birthday. Write your grade in school. Underline Boy if you are a boy. Underline Girl if you are a girl. Answer the next two questions by underlining Yes or No."

After pupils have completed the data called for, say: "Now we are ready for the directions." Read with the pupils the directions on the outside of the test booklet and do with them the sample exercises.

Say: "We shall now do some sample exercises together so that you will know just how to do the first part of your test. There will be more samples later to help you with other parts of the test. Look at Sample 1. I am going to pronounce a list of words. Circle the word which begins with the same sound as the words which I pronounce. Listen."

Pronounce: bisque (bĭsk), boron (bō´ rŏn)

Say: "Did you all circle box? That is right. Now look at Sample 2 and listen again. Circle the word which ends with the same two sounds as the words which I pronounce."

Pronounce: attest, robust

Say: "Did you all circle mast? Now look at Sample 3. Circle the word which contains the same vowel sound as the words which I shall pronounce. The vowels are a, e, i, o, u. Listen for the sound of one of these vowels."

Pronounce: hăg, măl

Say: "Did you all circle ham? Now look at Sample 4. Circle the word which ends with the same syllable as the words which I shall pronounce."

Pronounce: fŭsty, polity (pŏl´ ĭ tĭ)

Say: "Did you all circle forty?"

WORD ANALYSIS TEST
for
JUNIOR-SENIOR HIGH SCHOOL

Directions for Administering

Pass out the test booklets with instructions not to open them until the signal is given.

Say: "In the space at the top of the page write your last name and then your first name. Write today's date (give it). Write the name of your school and the name of your city or town. Write your age in the next space. Then write the month and day of your birthday. Write your grade in school. Underline Boy if you are a boy. Underline Girl if you are a girl. Answer the next two questions by underlining Yes or No."

After pupils have completed the data called for, say: "Now we are ready for the directions." Read with the pupils the directions on the outside of the test booklet and do with them the sample exercises.

Say: "We shall now do some sample exercises together so that you will know just how to do the first part of your test. There will be more samples later to help you with other parts of the test. Look at Sample 1. I am going to pronounce a list of words. Circle the word which begins with the same sound as the words which I pronounce. Listen."

Pronounce: bisque (bĭsk), boron (bō´rŏn)

Say: "Did you all circle box? That is right. Now look at Sample 2 and listen again. Circle the word which ends with the same two sounds as the words which I pronounce."

Pronounce: attest, robust

Say: "Did you all circle mast? Now look at Sample 3. Circle the word which contains the same vowel sound as the words which I shall pronounce. The vowels are a, e, i, o, u. Listen for the sound of one of these vowels."

Pronounce: hăg, măl

Say: "Did you all circle ham? Now look at Sample 4. Circle the word which ends with the same syllable as the words which I shall pronounce."

Pronounce: fŭsty, polity (pŏl´ĭ tĭ)

Say: "Did you all circle forty?"

Answer at this point any questions which pupils may have about the samples. Then say: "Now do you understand that you are to listen and to circle only the part which you are told to circle? Then we are ready to begin. Open your books to Test I. I shall stand in the back of the room so that you cannot see my lips when I read the words."

Test I, Part A Read with the pupils the directions for Test I, Part A. Say: "Each time wait for me to read both words in my list before you circle the word on your paper."

Then read the following words. Try to read with clear, accurate enunciation but without exaggeration. Allow about one second for the pronunciation of each word. When you have finished pronouncing the words, allow about three seconds for pupils to find and circle the word before going on to the next item. Then say: "Number....., ready," and pronounce the next words.

1. victress, vertical

2. necklet, noddle

3. legatee, lūmen

4. heptite, hackle

5. dermol, dunite (dŭn īt)

Test I, Part B Read with the pupils the directions for Test I, Part B. Say: "Do not circle any word until you have heard both words in my list." Allow three seconds for pupils to find and circle the word.

1. staddle, staith (stāth)

2. globose (glō´ bōs), gleg

3. bridoon (brĭ dōōn´), brogan (brō´ găn)

4. planchette (plăn shĕt´), plĕbs

5. twaddle, twit

Test I, Parts C - J Continue with sections C, D, and E of Part I, in each case reading the directions with the pupils and pronouncing the words in the same way as in Parts A and B.

Part C

1. gleed, redound

2. fluvial (flōō´ vĭ ăl), trefoil (trē´ foil)

Answer at this point any questions which pupils may have about the samples. Then say: "Now do you understand that you are to listen and to circle only the part which you are told to circle? Then we are ready to begin. Open your books to Test I. I shall stand in the back of the room so that you cannot see my lips when I read the words."

Test I, Part A Read with the pupils the directions for Test I, Part A. Say: "Each time wait for me to read both words in my list before you circle the word on your paper."

Then read the following words. Try to read with clear, accurate enunciation but without exaggeration. Allow about one second for the pronunciation of each word. When you have finished pronouncing the words, allow about three seconds for pupils to find and circle the word before going on to the next item. Then say: "Number....., ready," and pronounce the next words.

1. victress, vertical

2. necklet, noddle

3. legatee, lūmen

4. heptite, hackle

5. dermol, dunite (dŭn īt)

Test I, Part B Read with the pupils the directions for Test I, Part B. Say: "Do not circle any word until you have heard both words in my list." Allow three seconds for pupils to find and circle the word.

1. staddle, staith (stāth)

2. globose (glō bōs), gleg

3. bridoon (brĭ dōōn), brogan (brō găn)

4. planchette (plăn shĕt), plĕbs

5. twaddle, twit

Test I, Parts C - J Continue with sections C, D, and E of Part I, in each case reading the directions with the pupils and pronouncing the words in the same way as in Parts A and B.

Part C

1. gleed, redound

2. fluvial (flōō vĭ ăl), trefoil (trē foil)

3. sulphone, foin

4. resp, dewlap

5. glaik (glāk), gnostic (nŏs´ tĭk)

Part D

1. rasp, interclasp

2. rant, loment (lō´ mĕnt)

3. mutable, docible (dŏs´ ĭ bl)

4. nomarch (nŏm´ ärk), murk

5. surd, picard (pĭk´ ärd)

Part E

1. module (mŏd´ ūl), murdrum

2. shire, sheave

3. gulose (gū´ lōs), gonophore (gŏn´ ō´ fōr)

4. demur (dē´ mûr´), digamma (dī´ găm´ ä)

5. helve, hopple

Part F Read the directions with the pupils. Then say: We shall do a sample together." Pronounce: pentad (pĕn´ tăd). Allow five seconds for circling the sounds. Then say: "Did you circle p, a, e, d?" Pronounce kyrine (kī´ rĭn). Pause for five seconds. Then say: "Did you circle n?" Proceed in this way allowing five seconds after each word for the students to circle the sounds.

1. rhabdite (răb´ dīt)

2. spicule (spĭk´ ūl)

3. vesicle (vĕs´ ĭ k´l)

4. widgeon (wĭj´ ŭn)

5. rimose (rī´ mōs)

6. polyad (pŏl´ ĭ ăd)

7. obex (ō´ bĕks)

8. lactone (lăk´ tōn)

3. sulphone, foin

4. resp, dewlap

5. glaik (glāk), gnostic (nŏs´ tĭk)

Part D

1. rasp, interclasp

2. rant, lament (lō´ mĕnt)

3. mutable, docible (dŏs´ ĭ bl)

4. nomarch (nŏm´ ärk), mark

5. surd, picard (pĭk´ ärd)

Part E

1. module (mŏd´ ūl), murdrum

2. shire, sheave

3. gulose (gū´ lōs), gonophore (gŏn´ ō´ fōr)

4. demur (dē´ mûr), digamma (dī´ găm´ ä)

5. helve, hopple

Part F Read the directions with the pupils. Then say: "We shall do a sample together." Pronounce: pentad (pĕn´ tăd). Allow five seconds for circling the sounds. Then say: "Did you circle p, a, e, d?" Pronounce kyrine (kī´ rĭn). Pause for five seconds. Then say: "Did you circle n?" Proceed in this way allowing five seconds after each word for the students to circle the sounds.

1. rhabdite (răb´ dīt)

2. spicule (spĭk´ ūl)

3. vesicle (vĕs´ ĭ k´l)

4. widgeon (wĭj´ ŭn)

5. rimose (rī´ mōs)

6. polyad (pŏl´ ĭ ăd)

7. obex (ō´ bĕks)

8. lactone (lăk´ tōn)

9. greisen (grī z'n)

10. factive

11. duteous

12. cracknel

13. atmolysis (ăt mŏl ĭ sĭs)

14. deutoplasm (dū tō plăz'm)

15. histozyme

Part G Continue with Parts G, H, I, J of Part I, allowing only three seconds for pupils to find and circle the words.

1. ken, teff

2. dib, rick

3. hack, raff

4. sol, hob

5. lex, dell

6. vug, mull

Part H

1. precarium (prē kā rĭ ŭm), prelithic (prē lĭth ĭk)

2. defame, degressive

3. ungird, unmitigated

4. convolution, conduce

5. adnascent, adventive

Part I

1. supination (sū pĭ nā shŭn), provection

2. excoriate, imperate

3. elative (ē lā tĭv), interdictive (in tĕr dĭk tĭv)

4. permissory, septenary

5. gummiferous, multifarious

9. greisen (grī zʼn)

10. factive

11. duteous

12. crachnel

13. atmolysis (ăt mŏl´ĭ sĭs)

14. deutoplasm (dū´ tō plăzʼm)

15. histozyme

Part G Continue with Parts G, H, I, J of Part I, allowing only three seconds for pupils to find and circle the words.

1. ken, teff

2. dib, rick

3. hack, raff

4. sol, hob

5. lex, dell

6. vug, mull

Part H

1. precarium (prē´ kā´ rĭ ŭm), prelithic (prē lĭth´ ĭk)

2. defame, degressive

3. ungird, unmitigated

4. convolution, conduce

5. adnascent, adventive

Part I

1. supination (sū pĭ nā´ shŭn), provection

2. exoriate, imperate

3. elative (ē lā´ tĭv), interdictive (in tĕr dĭk´ tĭv)

4. permissory, septenary

5. gummiferous, multifarious

Part J

1. brisket

2. palindrome (păl´ ĭn drōm)

3. reticulum (rē tĭk´ ū lŭm)

4. metabasis (mē tăb´ ə sĭs)

5. dissimilitude

Test II, Part A Read the directions with the pupils. Then say: "We shall do a sample together. Listen while I say the separate sounds of a word. Then you will circle the word on your paper which is made up of the sounds which I say. I shall pronounce each series of sounds twice. Do not circle any word until you have heard the sounds twice."

Pronounce: n ī d Give each sound its true value but do not exaggerate. Allow about one second for the pronunciation of each sound. Repeat. Allow about three seconds for the pupils to find and circle the word.

Say: "Did you circle nide? Now you will do the rest of the parts of this section in the same way. Do you understand?"

Allow questions from the pupils concerning the directions.

Present each of the following items in the same way as the sample.

1. sh r l 2. d ŭ l s 3. p r ĭ v ĕ t

4. ĕ n r ă p t 5. b ŏ t f l ī

Test II, Part B Read the directions with the pupils. Say: "Now do the sample by yourselves." Pause. Say: "Did you write night? Are there any questions?"

Allow questions from the pupils.

Say: "Now do the rest of the parts of this test in the same way. You will have 3 minutes to complete Part B. Put your pencils down when I say 'Stop.'"

Allow 3 minutes to complete Part B. At the end of this time say: "Stop!"

Test III Read the directions with the pupils. Then say: "We shall do the sample together. Listen while I pronounce the word. I shall say it only once. Then you will put a circle around the number which corresponds to the number of syllables you heard in the word."

Part J

1. brisket

2. palindrome (pă̄l ĭn drōm)

3. reticulum (rē tĭk ū lŭm)

4. metabasis (mē tăb ȧ sĭs)

5. dissimilitude

Test II, Part A Read the directions with the pupils. Then say: "We shall do a sample together. Listen while I say the separate sounds of a word. Then you will circle the word on your paper which is made up of the sounds which I say. I shall pronounce each series of sounds twice. Do not circle any word until you have heard the sounds twice."

Pronounce: n ī d Give each sound its true value but do not exaggerate. Allow about one second for the pronunciation of each sound. Repeat. Allow about three seconds for the pupils to find and circle the word.

Say: "Did you circle nide? Now you will do the rest of the parts of this section in the same way. Do you understand?"

Allow questions from the pupils concerning the directions.

Present each of the following items in the same way as the sample.

1. sh r l 2. d ŭ l s 3. p r ĭ v ĕ t

4. ĕ n r ă p t 5. b ŏ t f l ī

Test II, Part B Read the directions with the pupils. Say: "Now do the sample by yourselves." Pause. Say: "Did you write night? Are there any questions?"

Allow questions from the pupils.

Say: "Now do the rest of the parts of this test in the same way. You will have 3 minutes to complete Part B. Put your pencils down when I say 'Stop.'"

Allow 3 minutes to complete Part B. At the end of this time say: "Stop!"

Test III Read the directions with the pupils. Then say: "We shall do the sample together. Listen while I pronounce the word. I shall say it only once. Then you will put a circle around the number which corresponds to the number of syllables you heard in the word."

Pronounce: niota (nĭ ṓ tȧ)

Allow three seconds for pupils to circle a number.

Say: "Did you circle 3? Are there any questions?"

Allow time for questions. Then say: "Do the rest of the parts of this test in the same way. Listen."

1. incuse (ĭn kūź)

2. hysteralysis

3. dephosphorize

4. chock

5. fractious

Test IV Read the directions with the pupils. Then say: "Now do the sample." Pause. Then say: "Did you do the sample like this?" Write the correct answer on the board. Say: "Are there any questions?"

Allow time for questions. Then say: "Do the remaining parts of this test in the same way. You will have three minutes to complete this part of the test. Put your pencils down as soon as I say, 'Stop.'"

Allow three minutes. Then say: "Stop!"

Test V Read the directions with the pupils. Then say: "Now we shall do a sample together. Listen."

Say: revest, revest

Allow five seconds for the pupils to write the word. Then say: "Did you write the word like this?" Write the word correctly on the board. Say: "Are there any questions?"

Allow time for questions. Say: "Do the remaining parts of the test in the same way." Present all the words in the list in the same way.

1. shim (shĭm)

2. emplastrum (ĕm plăś trŭm)

3. sarcoplasm (säŕ kō̍ plăżm)

4. templet (tĕḿ plĕt)

5. pentathlon (pĕn tăth́ lŏn)

Pronounce: niota (nĭ ṓ tȧ)

Allow three seconds for pupils to circle a number.

Say: "Did you circle 3? Are there any questions?"

Allow time for questions. Then say: "Do the rest of the parts of this test in the same way. Listen."

1. incuse (ĭn kūz)

2. hysteralysis

3. dephosphorize

4. chock

5. fractious

Test IV Read the directions with the pupils. Then say: "Now do the sample." Pause. Then say: "Did you do the sample like this?" Write the correct answer on the board. Say: "Are there any questions?"

Allow time for questions. Then say: "Do the remaining parts of this test in the same way. You will have three minutes to complete this part of the test. Put your pencils down as soon as I say, 'Stop.'"

Allow three minutes. Then say: "Stop!"

Test V Read the directions with the pupils. Then say: "Now we shall do a sample together. Listen."

Say: revest, revest

Allow five seconds for the pupils to write the word. Then say: "Did you write the word like this?" Write the word correctly on the board. Say: "Are there any questions?"

Allow time for questions. Say: "Do the remaining parts of the test in the same way." Present all the words in the list in the same way.

1. shim (shĭm)

2. emplastrum (ĕm plăś trŭm)

3. sarcoplasm (säŕ kṓ plăzm)

4. templet (tĕḿ plĕt)

5. pentathlon (pĕn tăth́ lŏn)

Test VI For this test a flashmeter is used. Set the flashmeter at 1/10 of a second.

Say: "This time we are going to see how quickly and accurately you can see. Look at the spot on the screen where the words will be flashed." Demonstrate with the machine by flashing merely a light on a certain spot to localize the attention of the pupils. Then say: "Look at Sample 1 on your paper. One of these words will be flashed on the screen. It will be flashed only once. Watch carefully. Ready!"

Flash the word. Allow about three seconds for the pupils to circle the word. Then say: "Did you circle mush? All right. Now look at Sample 2. We shall do this in the same way. Ready!" Flash the word. Say: "Did you circle regiment? Now look at Sample 3. We shall do this in the same way except that the flash will be faster."

Set the machine at 1/50 of a second. Then say: "Ready." Flash the word. Say: "Did you circle candy? Now look at Sample 4. We shall do this in the same way. Ready!" Flash the word. Say: "Did you circle different? Now look at Sample 6. Ready!" Flash the word. Say: "Did you circle passport? Now look at Sample 7. This time there is only a blank line for you to fill in. Watch very carefully. Notice the word which is flashed. Write that word on the blank line."

Set the machine at 1/10 of a second. Then say: "Ready!"

Flash the word. Allow about five seconds for the pupils to write the word they saw. Say: "Did you write team? Now look at Sample 8. The flash will be faster." Set the machine at 1/50 of a second. Then say: "Ready!" Flash the word. Allow about five seconds for the pupils to write the word they saw. Say: "Did you write invite? Are there any questions?"

Allow time for questions.

Part A Set the machine at 1/10 of a second. Read the directions with the pupils. Before each item say: "Put your finger on Number 1, 2, etc. Now look at the screen where the word will be flashed. Ready!"

Allow three seconds for circling each word.

Words:

1. there	3. paramide	5. telephotograph
2. without	4. legatary	

Part B Set the machine at 1/50 of a second. Read the directions with the pupils. Then say: "This test is the same as Part A except

Test VI For this test a Flashmeter is used. Set the Flashmeter at 1/10 of a second.

Say: "This time we are going to see how quickly and accurately you can see. Look at the spot on the screen where the words will be flashed." Demonstrate with the machine by flashing merely a light on a certain spot to localize the attention of the pupils. Then say: "Look at Sample 1 on your paper. One of these words will be flashed on the screen. It will be flashed only once. Watch carefully. Ready!"

Flash the word. Allow about three seconds for the pupils to circle the word. Then say: "Did you circle mean? All right. Now look at Sample 2. We shall do this in the same way. Ready!" Flash the word. Say: "Did you circle requirement? Now look at Sample 3. We shall do this in the same way except that the flash will be faster."

Set the machine at 1/50 of a second. Then say: "Ready." Flash the word. Say: "Did you circle ready? Now look at Sample 4. We shall do this in the same way. Ready!" Flash the word. Say: "Did you circle different? Now look at Sample 6. Ready!" Flash the word. Say: "Did you circle passport? Now look at Sample 7. This time there is only a blank line for you to fill in. Watch very carefully. Notice the word which is flashed. Write that word on the blank line."

Set the machine at 1/10 of a second. Then say: "Ready!"

Flash the word. Allow about five seconds for the pupils to write the word they saw. Say: "Did you write team? Now look at Sample 8. The flash will be faster." Set the machine at 1/50 of a second. Then say: "Ready!" Flash the word. Allow about five seconds for the pupils to write the word they saw. Say: "Did you write invite? Are there any questions?"

Allow time for questions.

Part A Set the machine at 1/10 of a second. Read the directions with the pupils. Before each item say: "Put your finger on Number 1, 2, etc. Now look at the screen where the word will be flashed. Ready!"

Allow three seconds for circling each word.

Words:

1. there	3. parade	5. telephotograph
2. without	4. lagatary	

Part B Set the machine at 1/50 of a second. Read the directions with the pupils. Then say: "This test is the same as Part A except

that the flashes will be faster. Are you ready?"

Proceed as in Part A.

Words:

1. tend
2. devise
3. fraternize
4. interaxis
5. illuminati

Part C Set the machine at 1/100 of a second. Read the directions with the pupils. Say: "This test is just the same as Parts A and B except that the flashes will be still faster. Do not worry if you cannot get them all. Let us see what sharp eyes you have. Are you ready?"

Proceed as in Parts A and B.

Words:

1. sift
2. heckle
3. figurine
4. personator
5. supplicatory

Part D Set the machine at 1/10 of a second. Read the directions with the pupils. Before each item say: "Put your finger on Number 1, 2, etc. Now look at the wall where the word will be flashed. Ready!"

Flash the word. Allow five seconds for writing each word.

Words:

1. node
2. sepsis
3. modulus
4. japonica
5. gigantology

Part E Set the machine at 1/50 of a second. Read the directions with the pupils. Say: "This test is just the same as Part D except that the flashes will be faster. Do not worry if you cannot write all the words. Are you ready?" Flash the words as before.

Words:

1. spiel
2. mattoid
3. laccolith
4. narratory
5. nitromuriate

Part F Set the machine at 1/100 of a second. Read the directions with the pupils. Say: "This test is just the same as Parts D and E except that the flashes will be very fast this time. See how many you can get." Proceed as before.

that the flashes will be faster. Are you ready?"

Proceed as in Part A.

Words:

1. tend 3. fraternize 5. illuminati

2. devise 4. interaxis

Part C Set the machine at 1/100 of a second. Read the directions with the pupils. Say: "This test is just the same as Parts A and B except that the flashes will be still faster. Do not worry if you cannot get them all. Let us see what sharp eyes you have. Are you ready?"

Proceed as in Parts A and B.

Words:

1. sift 3. figurine 5. supplicatory

2. heckle 4. personator

Part D Set the machine at 1/10 of a second. Read the directions with the pupils. Before each item say: "Put your finger on Number 1, 2, etc. Now look at the wall where the words will be flashed. Ready!"

Flash the word. Allow five seconds for writing each word.

Words:

1. node 3. modulus 5. gigantology

2. sepsis 4. japonica

Part E Set the machine at 1/50 of a second. Read the directions with the pupils. Say: "This test is just the same as Part D except that the flashes will be faster. Do not worry if you cannot write all the words. Are you ready?" Flash the words as before.

Words:

1. spiel 3. laccolith 5. nitromuriate

2. mattoid 4. narratory

Part F. Set the machine at 1/100 of a second. Read the directions with the pupils. Say: "This test is just the same as Parts D and E except that the flashes will be very fast this time. See how many you can get." Proceed as before.

Words:

1. tung
2. gibus
3. eliquate
4. matricula
5. oleography

Say: "That is all. Put down your pencils and close your test booklets."

Collect the booklets at once.

Words:

1. sung 3. oliguria 5. oleography

2. gibus 4. matricula

Say: "That is all. Put down your pencils and close your test booklets."

Collect the booklets at once.

WORD ANALYSIS TEST
for
JUNIOR-SENIOR HIGH SCHOOL

Directions for Scoring

Test I, Parts A, B, C, D, E, G, H, I, J; Test II, Part A; Test III; Test VI, Parts A, B, C: In these subtests the score is the total number of items right. Highest possible score is 5 except in Test I, Part G, where the highest possible score is 6.

Test I, Part F: Score is total number of sounds correctly circled minus one half the incorrectly circled sounds. Omitted sounds are not counted. Highest possible score is 29.

Test II, Part B: Score is total number right. Credit is given for any word which can be made from the given sounds. There is no penalty for wrong spelling as long as the pupil's intention is clear. Highest possible score is 8.

Test IV: Score is total number of correctly identified syllables. Highest possible score is 17.

Test V: Each sound is counted as one item in the test. The digraphs sh and th are single sounds. Highest possible score is 39. Score is computed by subtracting from 39 as follows:

1. one point for each omitted sound
2. one point for each incorrectly written sound
3. one point for each unnecessary sound written into the word

Test VI, Parts D, E, F: Each letter is considered as one item in the test. Highest possible score for Part D is 36, for Part E is 42, and for Part F is 36. Each letter in correct sequence from left to right in the word counts one point. Also each letter in correct sequence from right to left counts as one point. Counting should be done from both ends of the word. If three or more letters in the middle of the word are in correct sequence, even though they are surrounded by letters out of sequence, credit is allowed for the number of such letters in correct sequence minus one.

Examples:	Score
gigantology	11
gigabofip	4
fimtology	6
girentomalgy	6

WORD ANALYSIS TEST
for
JUNIOR-SENIOR HIGH SCHOOL

Directions for Scoring

Test I, Parts A, B, C, D, E, G, H, I, J; Test II, Part A; Test III; Test VI, Parts A, B, C: In these subtests the score is the total number of items right. Highest possible score is 5 except in Test I, Part G, where the highest possible score is 6.

Test I, Part F: Score is total number of sounds correctly circled minus one half the incorrectly circled sounds. Omitted sounds are not counted. Highest possible score is 29.

Test II, Part B: Score is total number right. Credit is given for any word which can be made from the given sounds. There is no penalty for wrong spelling as long as the pupil's intention is clear. Highest possible score is 8.

Test IV: Score is total number of correctly identified syllables. Highest possible score is 17.

Test V: Each sound is counted as one item in the test. The digraphs sh and th are single sounds. Highest possible score is 39. Score is computed by subtracting from 39 as follows:

1. one point for each omitted sound
2. one point for each incorrectly written sound
3. one point for each unnecessary sound written into the word

Test VI, Parts D, E, F: Each letter is considered as one item in the test. Highest possible score for Part D is 36, for Part E is 42, and for Part F is 36. Each letter in correct sequence from left to right in the word counts one point. Also each letter in correct sequence from right to left counts as one point. Counting should be done from both ends of the word. If three or more letters in the middle of the word are in correct sequence, even though they are surrounded by letters out of sequence, credit is allowed for the number of such letters in correct sequence minus one.

Examples:	Score
gigantology	11
gigabofip	4
fimtology	6
girentomalgy	6

Subtract one point for letters added at beginning or end of word.

Example:	Score
sepsise	5

WORD PRONUNCIATION TEST

Name _____

waning	_____	permanent	_____
banking	_____	commerce	_____
though	_____	proposition	_____
fright	_____	communion	_____
gasped	_____	expedition	_____
quantity	_____	procession	_____
vocation	_____	subside	_____
contend	_____	periodical	_____
prominent	_____	controversy	_____
commence	_____	incredible	_____
preposition	_____	precedent	_____
commission	_____	appropriation	_____
exposition	_____	initiative	_____
precision	_____	superficial	_____
subscribe	_____	episode	_____
warning	_____	commentary	_____
breaking	_____	despotism	_____
through	_____	municipal	_____
freight	_____	depreciate	_____
grasped	_____	synonym	_____
quality	_____	obsolete	_____
vacation	_____	arbitration	_____
content	_____	autobiography	_____

WORD PRONUNCIATION TEST

Name _____

waning	_____	permanent	_____
banking	_____	commerce	_____
though	_____	proposition	_____
fright	_____	commution	_____
grasped	_____	expedition	_____
quantity	_____	procession	_____
vocation	_____	subside	_____
content	_____	periodical	_____
prominent	_____	controversy	_____
commence	_____	incredible	_____
proposition	_____	precedent	_____
commission	_____	appropriation	_____
exposition	_____	initiative	_____
precision	_____	superficial	_____
subscribe	_____	episode	_____
warning	_____	commentary	_____
breaking	_____	despotism	_____
through	_____	municipal	_____
freight	_____	depreciate	_____
grasped	_____	synonym	_____
quality	_____	obsolete	_____
vacation	_____	arbitration	_____
content	_____	autobiography	_____

paradox	_____	figurative	_____
ambiguous	_____	hyperbole	_____
psychological	_____	delineate	_____
repudiate	_____	stereotyped	_____
voluminous	_____	extradition	_____
personification	_____	antithesis	_____
strategic	_____	reciprocity	_____

paradox	_____	figurative	_____
ambiguous	_____	hyperbole	_____
psychological	_____	delineate	_____
repudiate	_____	stereotyped	_____
voluminous	_____	extradition	_____
personification	_____	antithesis	_____
strategic	_____	reciprocity	_____

SPELLING TEST FOR PRELIMINARY STUDY[1/]

Directions for administering: Pronounce the word. Read the sentence containing the word. Then pronounce the word again.

1. run	The boy can run.	run
2. top	The top will spin.	top
3. red	My apple is red.	red
4. book	I lost my book.	book
5. sea	The sea is rough.	sea
6. play	I will play with you.	play
7. lay	Lay the book down.	lay
8. led	He led the horse to the barn.	led
9. add	Add these figures.	add
10. alike	These books are alike.	alike
11. mine	That bicycle is mine.	mine
12. with	Mary will go with you.	with
13. easy	Our lessons are not easy.	easy
14. shut	Please shut the door.	shut
15. done	Has he done the work?	done
16. body	The chest is a part of the body.	body
17. anyway	I shall go anyway.	anyway
18. omit	Please omit the next verse.	omit
19. fifth	This is my fifth trip.	fifth
20. reason	Give a reason for being late.	reason
21. perfect	This is a perfect day.	perfect
22. friend	She is my friend.	friend
23. getting	I am getting tired.	getting
24. nearly	Nearly all of the candy is gone.	nearly
25. desire	I have no desire to go.	desire
26. arrange	Please arrange a meeting for me.	arrange
27. written	I have written four letters.	written
28. search	Search for your book.	search
29. popular	He is a popular boy.	popular
30. interest	Show some interest in your work.	interest
31. pleasant	She is very pleasant.	pleasant
32. therefore	Therefore I cannot go.	therefore
33. folks	My folks have gone away.	folks
34. celebration	There will be a celebration today.	celebration
35. minute	Wait a minute.	minute
36. divide	Divide this number by ten.	divide
37. necessary	It is necessary for you to study.	necessary
38. height	What is your height?	height
39. reference	He made reference to the lesson.	reference
40. career	The future holds a bright career for you.	career
41. character	He has a good character.	character
42. separate	Separate these papers.	separate
43. committee	The committee is small.	committee

1/List 1 from J. Cayce Morrison and William A. McCall, Morrison-McCall Spelling Scale. Yonkers-on-Hudson, New York: World Book Company, 1923.

SPELLING TEST FOR PRELIMINARY STUDY [1]

Directions for administering: Pronounce the word. Read the sentence containing the word. Then pronounce the word again.

1. run	The boy can run.	run
2. top	The top will spin.	top
3. red	My apple is red.	red
4. book	I lost my book.	book
5. sea	The sea is rough.	sea
6. play	I will play with you.	play
7. lay	Lay the book down.	lay
8. led	He led the horse to the barn.	led
9. add	Add these figures.	add
10. alike	These books are alike.	alike
11. mine	That bicycle is mine.	mine
12. with	Mary will go with you.	with
13. easy	Our lessons are not easy.	easy
14. shut	Please shut the door.	shut
15. done	Has he done the work?	done
16. body	The chest is a part of the body.	body
17. anyway	I shall go anyway.	anyway
18. omit	Please omit the next verse.	omit
19. fifth	This is my fifth trip.	fifth
20. reason	Give a reason for being late.	reason
21. perfect	This is a perfect day.	perfect
22. friend	She is my friend.	friend
23. getting	I am getting tired.	getting
24. nearly	Nearly all of the candy is gone.	nearly
25. desire	I have no desire to go.	desire
26. arrange	Please arrange a meeting for me.	arrange
27. written	I have written four letters.	written
28. search	Search for your book.	search
29. popular	He is a popular boy.	popular
30. interest	Show some interest in your work.	interest
31. pleasant	She is very pleasant.	pleasant
32. therefore	Therefore I cannot go.	therefore
33. folks	My folks have gone away.	folks
34. celebration	There will be a celebration today.	celebration
35. minute	Wait a minute.	minute
36. divide	Divide this number by ten.	divide
37. necessary	It is necessary for you to study.	necessary
38. height	What is your height?	height
39. reference	He made reference to the lesson	reference
40. career	The future holds a bright career for you.	career
41. character	He has a good character.	character
42. separate	Separate these papers.	separate
43. committee	The committee is small.	committee

[1] List I from G. Cayce Morrison and William A. McCall, Morrison-McCall Spelling Scale. Yonkers-on-Hudson, New York: World Book Company, 1923.

44. annual	This is the annual meeting.	annual
45. principle	The theory is wrong in principle.	principle
46. immense	The man is carrying an immense load.	immense
47. judgment	The teacher's judgment is good.	judgment
48. acquaintance	He is an acquaintance of mine.	acquaintance
49. discipline	The army discipline was strict.	discipline
50. lieutenant	He is a lieutenant in the army.	lieutenant

44. annual	This is the annual meeting.	annual
45. principle	The theory is wrong in principle.	principle
46. immense	The man is carrying an immense load.	immense
47. judgment	The teacher's judgment is good.	judgment
48. acquaintance	He is an acquaintance of mine.	acquaintance
49. discipline	The army discipline was strict.	discipline
50. lieutenant	He is a lieutenant in the army.	lieutenant

FREQUENCY DISTRIBUTION OF TEST I, PART A

Scores	Frequencies
5	37
4	10
3	7
2	6
1	5
0	0

N = 65

Range = 1 - 5

Mean = 4.05

Standard Deviation = 1.317

FREQUENCY DISTRIBUTION OF TEST I, PART B

Scores	Frequencies
5	38
4	12
3	9
2	3
1	2
0	1

N = 65

Range = 0 - 5

Mean = 4.2

Standard Deviation = 1.179

FREQUENCY DISTRIBUTION OF TEST I, PART A

Scores	Frequencies
5	27
4	10
3	7
2	6
1	5
0	0

N = 65

Range = 1 - 5

Mean = 4.05

Standard Deviation = 1.317

FREQUENCY DISTRIBUTION OF TEST I, PART B

Scores	Frequencies
5	38
4	12
3	9
2	3
1	2
0	1

N = 65

Range = 0 - 5

Mean = 4.2

Standard Deviation = 1.179

FREQUENCY DISTRIBUTION OF TEST I, PART C

Scores	Frequencies
5	22
4	16
3	11
2	9
1	5
0	2

N = 65

Range = 0 - 5

Mean = 3.538

Standard Deviation = 1.426

FREQUENCY DISTRIBUTION OF TEST I, PART D

Scores	Frequencies
5	8
4	25
3	20
2	8
1	2
0	2

N = 65

Range = 0 - 5

Mean = 3.354

Standard Deviation = 1.129

FREQUENCY DISTRIBUTION OF TEST I, PART C

Scores	Frequencies
5	22
4	15
3	11
2	7
1	5
0	2

N = 65

Range = 0 - 5

Mean = 3.538

Standard Deviation = 1.426

FREQUENCY DISTRIBUTION OF TEST I, PART D

Scores	Frequencies
5	8
4	25
3	20
2	8
1	2
0	2

N = 65

Range = 0 - 5

Mean = 3.354

Standard Deviation = 1.129

FREQUENCY DISTRIBUTION OF TEST I, PART E

Scores	Frequencies
5	6
4	8
3	13
2	15
1	16
0	7

N = 65

Range = 0 - 5

Mean = 2.261

Standard Deviation = 1.232

FREQUENCY DISTRIBUTION OF TEST I, PART H

Scores	Frequencies
5	23
4	16
3	5
2	11
1	4
0	6

N = 65

Range = 0 - 5

Mean = 3.385

Standard Deviation = 1.661

FREQUENCY DISTRIBUTION OF TEST I, PART II

Scores	Frequencies
5	6
4	8
3	13
2	15
1	16
0	7

N = 65

Range = 0 - 5

Mean = 2.261

Standard Deviation = 1.232

FREQUENCY DISTRIBUTION OF TEST I, PART II

Scores	Frequencies
5	23
4	16
3	5
2	11
1	4
0	6

N = 65

Range = 0 - 5

Mean = 3.385

Standard Deviation = 1.661

FREQUENCY DISTRIBUTION OF TEST I, PART I

Scores	Frequencies
5	30
4	17
3	11
2	4
1	0
0	3

N = 65

Range = 0 - 5

Mean = 3.985

Standard Deviation = 1.271

FREQUENCY DISTRIBUTION OF TEST I, PART J

Scores	Frequencies
5	45
4	13
3	5
2	2

N = 65

Range = 2 - 5

Mean = 4.554

Standard Deviation = .764

FREQUENCY DISTRIBUTION OF TEST I, PART I

Scores	Frequencies
5	30
4	17
3	11
2	4
1	0
0	3

N = 65

Range = 0 - 5

Mean = 3.985

Standard Deviation = 1.271

FREQUENCY DISTRIBUTION OF TEST I, PART 1

Scores	Frequencies
5	45
4	13
3	5
2	2

N = 65

Range = 2 - 5

Mean = 4.554

Standard Deviation = .764

FREQUENCY DISTRIBUTION OF TEST II, PART A

Scores	Frequencies
6	2
5	32
4	17
3	7
2	6
1	1
0	0

N = 65

Range = 1 - 6

Mean = 4.215

Standard Deviation = 1.089

FREQUENCY DISTRIBUTION OF TEST II, PART A

Scores	Frequencies
6	2
5	32
4	17
3	7
2	6
1	1
0	0

N = 65

Range = 1 - 6

Mean = 4.215

Standard Deviation = 1.089

FREQUENCY DISTRIBUTION OF TEST IV

Scores	Frequencies
17	2
16	1
15	1
14	2
13	7
12	3
11	10
10	7
9	5
8	5
7	4
6	7
5	4
4	1
3	1
2	3
1	0
0	2

N = 65

Range = 0 - 17

Mean = 9.046

Standard Deviation = 3.877

FREQUENCY DISTRIBUTION OF TEST IV

Scores	Frequencies
17	2
16	1
15	1
14	2
13	7
12	3
11	10
10	7
9	5
8	5
7	4
6	7
5	4
4	1
3	1
2	3
1	0
0	2

N = 65

Range = 0 - 17

Mean = 9.046

Standard Deviation = 3.877

APPENDIX B

MATERIALS USED IN MAIN STUDY

WORD ANALYSIS TEST
for
JUNIOR-SENIOR HIGH SCHOOL
by Olive S. Niles

Name _____ Date _____
(last) (first)

School _____ City or town _____

Age _____ Birthday _____ Grade _____ Boy Girl
(month) (day)

The teacher will show you two words which are printed on cards. Copy them exactly as they are on the cards. Use the lines below. Use your best handwriting.

1. _____

2. _____

The teacher will say some words to you. Listen carefully and circle the word in each line which she says to you.

1.	cake	man	map	make	take
2.	sail	face	fail	fate	rail
3.	candle	bundle	canoe	candy	needle

Directions:

The following pages contain several exercises which are intended to measure your ability to hear sounds accurately and to see combinations of letters rapidly and correctly.

Most of the words used in the exercises are real words. A few are nonsense words. Most of them you will never have heard before. Do not be disturbed by this fact. Remember that the exercises are intended to measure your ability to hear and to see. The fact that the meanings are not known to you will not affect your score in any way.

Listen carefully to directions and follow them exactly. Do not turn the page until you are told to do so.

Sample 1:	k	f	d	r	s	y	p	l
Sample 2:	k	l	d	n	h	p	g	t
Sample 3:	b	g	v	m	p	t	f	w
Sample 4:	f	n	b	l	m	j	d	h
Sample 5:	w	p	h	v	m	r	j	y

WORD ANALYSIS TEST
for
JUNIOR-SENIOR HIGH SCHOOL
by Olive S. Miles

Name _____ Date _____
(last) (first)

School _____ City or town _____

Age _____ Birthday _____ Grade _____ Boy Girl
(month) (day)

The teacher will show you two words which are printed on cards. Copy them exactly as they are on the cards. Use the lines below. Use your best handwriting.

1. _____

2. _____

The teacher will say some words to you. Listen carefully and circle the word in each line which she says to you.

1. cake man map make take

2. sail face fail fate rail

3. candle bundle canoe candy needle

Directions:

The following pages contain several exercises which are intended to measure your ability to hear sounds accurately and to see combinations of letters rapidly and correctly.

Most of the words used in the exercises are real words. A few are nonsense words. Most of them you will never have heard before. Do not be disturbed by this fact. Remember that the exercises are intended to measure your ability to hear and to see. The fact that the meanings are not known to you will not affect your score in any way.

Listen carefully to directions and follow them exactly. Do not turn the page until you are told to do so.

Sample 1: k f d r s y p l

Sample 2: k l d n h p g t

Sample 3: b g v m p t f w

Sample 4: f n b l m j d h

Sample 5: w p h v m r j x

TEST I

Part A

Directions: In this exercise you have lists of sounds. Circle all the sounds in each list which you hear at the beginning or the end of the words I pronounce. Do not try to think of the spelling. Think only of the sounds you hear.

1.	r	f	l	m	t	w	g	k	
2.	m	th	f	t	b	l	sh	w	
3.	p	f	b	w	sh	p	z	m	
4.	b	w	n	th	k	f	sh	s	
5.	f	p	sh	k	l	h	m	wh	
6.	z	g	l	d	m	wh	k	v	
7.	n	t	ch	k	p	th	s	g	
8.	f	j	wh	n	b	sh	y	b	
Sample 1:		b	f	m	ch	d	l	w	r
Sample 2:		v	sh	b	p	l	th	f	t
9.	r	s	f	k	ch	r	sh	g	
10.	n	k	p	d	f	g	h	z	
11.	th	m	f	l	z	sh	w	r	
12.	g	h	th	p	r	l	v	m	
13.	s	ch	r	sh	p	d	th	k	
14.	p	th	d	ch	v	m	sh	g	
15.	t	th	r	f	g	sh	b	h	
16.	p	b	d	wh	g	f	l	k	

TEST I

Part A

Directions: In this exercise you have lists of sounds. Circle all the sounds in each list which you hear at the beginning or the end of the words pronounce. Do not try to think of the spelling. Think only of the sounds you hear.

1.	r	f	l	m	t	w	g	k	
2.	m	th	f	t	b	l	sh	w	
3.	p	f	b	w	sh	p	s	m	
4.	b	w	n	th	k	f	sh	s	
5.	f	p	sh	k	l	h	m	wh	
6.	z	g	l	d	m	wh	k	v	
7.	n	t	ch	k	p	th	s	g	
8.	f	j	wh	n	b	sh	y	b	
Sample 1:	b	f	m	ch	d	l	w	r	
Sample 2:	v	sh	b	p	l	th	f	t	
9.	r	s	f	w	ch	r	sh	g	
10.	n	k	p	d	f	g	h	z	
11.	th	m	f	l	z	sh	w	r	
12.	g	h	th	p	r	l	v	m	
13.	s	ch	r	sh	p	d	th	k	
14.	p	th	d	ch	v	n	sh	g	
15.	t	th	r	f	g	sh	b	h	

Sample 1:		n	br	p	st	h	m	bl	sh	f	th
Sample 2:		f	nt	b	ch	pr	mp	w	m	k	sl
17.	y	d	tr	f	pr	cr	l	sh	pt	sp	
18.	sn	t	sh	sl	h	pl	z	b	j	ch	
19.	t	ch	tw	pr	k	fl	st	pl	h	gr	
20.	f	sh	nt	d	th	rp	rt	k	l	lt	
21.	m	sm	p	dr	ch	fl	w	b	gr	pl	
22.	dr	t	g	h	wh	sk	ks	rk	th	m	
23.	d	g	th	k	rm	st	lk	thr	mp	p	
24.	j	w	n	rn	v	ch	nd	h	lm	ng	
Sample 1:		t	v	fl	a	th	fr	rm	e	z	p
Sample 2:		l	sh	p	sk	v	o	mp	z	wh	u
Sample 3:		i	t	f	e	b	u	ch	a	s	th
25.	sl	f	a	sp	bl	i	rt	w	n	th	
26.	rg	sw	p	sl	sp	z	a	k	g	e	
27.	s	a	wh	u	br	pl	th	e	st	h	
28.	sl	u	p	i	sk	lm	ld	rl	th	sp	
29.	o	s	u	kt	t	nd	kl	z	b	bl	
30.	l	s	lt	o	rl	sl	d	a	i	rn	
31.	a	p	z	th	e	k	sh	i	d	o	
32.	st	v	fl	i	bl	o	f	sp	a	th	

Sample 1: n br p et n m bl nh j th

Sample 2: f nt b ch pr mp w m e dl

17. y d tr f pr or l nn pt op

18. sn t nh sl h pl s b j ch

19. t ch tw pr k fl ct pl h qr

20. f sh nt d th rp rt k l lt

21. n sm p dr ch fl w b gr pl

22. dr t g h wh sk kn rk th m

23. d g th k rm st lk thr mp p

24. j w h rn v ch rd h lm rg

Sample 1: t v fl s th lr rm e s p

Sample 2: l sh p nr v o mp x wh n

Sample 3: l t f e f u ch x s th

25. sl f s sp hl l rt w n th

26. rg sw y sl sp z s k g s

27. s s wh u hr pl th e st h

28. sl u p i sk lm lk rl th sp

29. o s n kt t rd kl z h hl

30. l s lt o rl sl d u l rr

31. s p c th e k sh l d c

33.	u	y	m	wh	t	i	e	th	lp	sp
34.	rm	a	lp	lm	u	th	fl	i	h	fr
35.	a	u	s	wh	e	ts	th	nk	m	ch
36.	cr	sh	cl	s	j	g	ch	kt	tl	th
37.	a	v	k	st	nd	tw	ng	i	gr	nk
38.	rf	g	y	f	t	j	rd	lt	gl	nd
39.	d	gl	pl	p	o	b	i	a	h	th
40.	lm	k	sh	b	mp	ch	f	j	u	e
41.	v	sm	f	o	th	r	a	ch	u	rt
42.	sl	rf	st	d	rk	u	w	p	a	lk

Part B

Directions: Circle the word which contains the same vowel sound as the words you hear. The vowels are a, e, i, o, u.

Sample 1: don pin hen sun pan

Sample 2: nut get fat rot pit

1. pep sap cup rip hop

2. sick puck tack rock neck

3. web rob nub fib cab

4. led cod bad mud rid

5. chaff stiff muff clef doff

6. hog leg fig mug tag

33.	u	y	m	wh	t	i	e	th	lp	sp
34.	rm	a	lp	lm	u	th	fl	i	h	fr
35.	a	u	s	wh	e	ts	th	nk	m	ch
36.	cr	sh	cl	s	j	g	ch	kt	tl	th
37.	a	v	k	st	nd	tw	ng	i	gr	nk
38.	rf	g	y	f	t	j	rd	lt	gl	nd
39.	d	gl	pl	p	o	b	i	a	h	th
40.	lm	k	sh	b	mp	ch	f	j	u	e
41.	v	em	f	o	th	r	a	ch	u	rt
42.	al	rf	st	d	rk	u	w	p	a	lk

Part B

Directions: Circle the word which contains the same vowel sound as the words you hear. The vowels are a, e, i, o, u.

Sample 1: don pin hen sun pan

Sample 2: nut get fat rot pit

1. pep sap cup rip hop

2. sick puck tack rock neck

3. web rob nub fib cab

4. led cod bad mud rid

5. chaff stiff muff clef doff

6. hog leg fig mug tag

7.	tom	sum	ham	rim	gem
8.	mass	bus	guess	toss	kiss
9.	pet	rat	fit	hot	but
10.	dull	doll	pal	sell	fill
11.	sin	don	ran	bun	pen
12.	map	tip	sup	cop	pep

TEST II

Directions: As each word is pronounced, listen for the number of syllables which you hear. Circle the figure which represents the number of syllables in the word.

Sample 1:	1	2	3	4	5	6	7	8
Sample 2:	1	2	3	4	5	6	7	8
1.	1	2	3	4	5	6	7	8
2.	1	2	3	4	5	6	7	8
3.	1	2	3	4	5	6	7	8
4.	1	2	3	4	5	6	7	8
5.	1	2	3	4	5	6	7	8
6.	1	2	3	4	5	6	7	8
7.	1	2	3	4	5	6	7	8
8.	1	2	3	4	5	6	7	8
9.	1	2	3	4	5	6	7	8
10.	1	2	3	4	5	6	7	8

TEST III

Directions: You will find below some groups of sounds which you are to blend into words. A mark like this ‾ indicates a long vowel. A mark like this ˘ is a sign of a short vowel. A mark like this ´ shows where the accent is placed.

Study the following words to make sure you know the long and short vowel sounds:

Long vowels	Short vowels
mātē	mă̆t
mēat	mĕ̆t
mīle	mĭ̆ll
cōat	cŏ̆t
tūbe	tŭ̆b

The following words will all fit under the four headings which are given below. The first three have been done for you. You are to put the rest of the words under the correct headings. Write both the word and its number under the heading.

1. pēz
2. lăm
3. kwŏr´ ĭ
4. mīs
5. skōr
6. ŭ´ of ĭ s
7. kŏl´ ĕ j
8. mŭng´ kĭ
9. lĕt´ ĭ s
10. skē´ ĭng
11. pē´ kŏk
12. kăb´ ĭ j
13. hwāl
14. sĭ´ tĭ
15. hĕv´ ĭ wāt
16. ŭn´ yŭn
17. plă tō´
18. hŏk´ ĭ

Animals

2. lamb

Vegetables

1. peas

Sports Words

Places

3. quarry

TEST III

Directions: You will find below some groups of sounds which you are to blend into words. A mark like this ¯ indicates a long vowel. A mark like this ˘ is a sign of a short vowel. A mark like this ˆ shows where the accent is placed.

Study the following words to make sure you know the long and short vowel sounds:

Long vowels	Short vowels
mōte	ăpt
ātē	ŏdd
ēlē	ĭll
ōbēy	ŭp
tūbe	ŭb

The following words will all fit under the four headings which are given below. The first three have been done for you. You are to pick the rest of the words under the correct headings. Write both the word and its number under the heading.

1. pēa
2. lēa
3. bŏr ĭ
4. mēa
5. ŏdĭr
6. ŏl ōa
7. ŭnĭ ōi
8. mŭng ŭd
9. lāt ĭa
10. ŏte ĭng
11. pē ŭsk
12. ŭsb ĭ ŭ
13. bŭnĭ
14. ŏl ĭŭ
15. bŏr ĭ ŭt
16. ōn ŭm
17. pŭk ŭt
18. ŭsk ĭ

Animals	Vegetables
2. lamb	1. pea

Short Words	Places
	3. quarry

TEST IV

Directions: Some nonsense words will be pronounced. They are spelled just the way they sound. The little boxes below will tell you just how many letters are in each word. You are to put one letter in each box.

The letters must be in the right order in the boxes to be scored correct. For example, if you wrote p a l t as p l a t, the second and third letters would be scored wrong and your total score on the word would be 2 instead of 4.

If you do not hear all the sounds in a word, put down the ones you do hear and try to put them in the right boxes. For example, in the word p i m t o r if you hear p i m and r but do not hear t and o, write what you heard like this

p	i	m			r

You will receive credit for every letter which is correct and which is also in the right box.

Be sure to dot your i's, cross your t's, and make each letter very clearly.

Sample 1: | | | |

Sample 2: | | | | | | |

Sample 3: | | | | | | |

1. | | | |

2. | | | |

3. | | | |

4. | | | | |

5. | | | | | |

6. | | | | | |

7. | | | | | |

8. | | | | | |

9. | | | | | | |

10. | | | | | | | |

11. | | | | | | | |

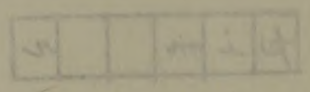
12. | | | | | | | | |

TEST II

Directions: Some nonsense words will be pronounced. They are spelled just the way they sound. The little boxes below will tell you just how many letters are in each word. You are to put one letter in each box.

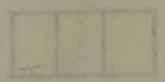
The letters must be in the right order in the boxes to be scored correct. For example, if you wrote p a l t as p l a t, the second and third letters would be scored wrong and your total score on the word would be 2 instead of 4.

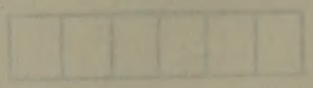
If you do not hear all the sounds in a word, put down the ones you do hear and try to put them in the right boxes. For example, in the word p l a t o r if you hear p l a and r but do not hear t and o, write what you heard like this

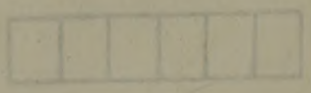


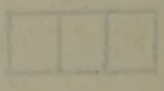
You will receive credit for every letter which is correct and which is also in the right box.

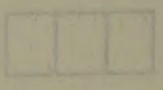
Be sure to dot your i's, cross your t's, and make each letter very clearly.

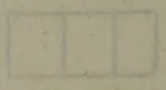
Sample 1: 

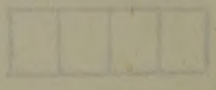
Sample 2: 

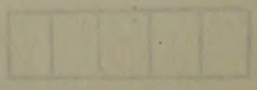
Sample 3: 

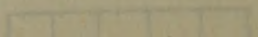
1. 

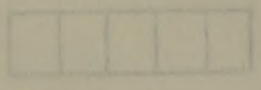
2. 

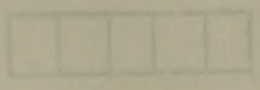
3. 

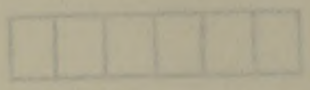
4. 

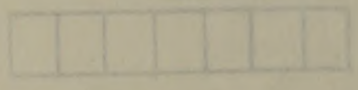
5. 

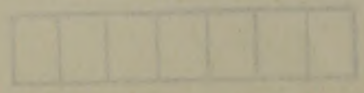
6. 

7. 

8. 

9. 

10. 

11. 

12.

13. ☐☐☐☐☐☐☐☐

14. ☐☐☐☐☐☐☐☐

15. ☐☐☐☐☐☐☐☐☐

16. ☐☐☐☐☐☐☐☐

17. ☐☐☐☐☐☐☐☐

18. ☐☐☐☐☐☐☐☐☐

19. ☐☐☐☐☐☐☐☐

20. ☐☐☐☐☐☐☐☐

21. ☐☐☐☐☐☐☐☐

22. ☐☐☐☐☐☐☐☐

23. ☐☐☐☐☐☐☐

24. ☐☐☐☐☐☐☐☐

TEST V

Directions: One of the five words in each line will be flashed just once. Watch carefully and circle the word which you see.

Part A

Sample 1: fish film mush file wish

Sample 2: harp tend hand find hawk

Sample 3: mark lost just mail mast

Sample 4: candle bundle cannot kindle cancer

Sample 5: notion option ration racial ragout

Sample 6: retort satire return attire retire

1. waft soon lift soft soap

2. corn code come fern burn

3. find fist lest five just

Page 8

13.		19.	
14.		20.	
15.		21.	
16.		22.	
17.		23.	
18.		24.	

TEST V

Directions: One of the five words in each line will be flashed just once. Watch carefully and circle the word which you see.

Part A

Sample 1: flab film much file wish

Sample 2: burp tend hand find back

Sample 3: mark load just mail meet

Sample 4: candle bundle cannot kindle cancer

Sample 5: motion option rotten coastal raspout

Sample 6: report matire return wtire retire

1. warf soon lift soft soap

2. corn code come fern burn

3. find fist last five just

4. sink jump just pink junk

5. craven cradle needle bundle cravat

6. pollen pollute foolish polish girlish

7. decide detail advice service device

8. relate remark dilate remain oblate

9. possible plausible fusible fusiform fusinist

10. visible visitor flexible delible visitress

11. generous general literal mineral generate

12. murderer wanderer wandering wanderlust blunderer

13. equitable hospitable veritistic veritable verificate

14. ampliation foliation foliolate foliiform palliation

15. calligraphy geography polygraphy geognostic geogenous

16. generator personify mediator personalism personator

17. derivative affirmative comparative comparison comparograph

18. meteorical meteorolite meteoristic capitalistic impressionistic

19. heterography heterogamy heterogony hierography lexicography

20. indispensable disagreeable reconciliate reconcilingly reconcilable

Part B

Directions: Watch carefully while some words are flashed. Each word will be flashed just once. There is a small box for each letter in the word. Fill in as many boxes as you can. To be considered correct, the letters must be in the right boxes. If you see the first part of the word and the last part but do not see the middle part, fill in all the letters which you saw. Try to put them in the right squares.

Sample 1: ☐☐☐

Sample 2: ☐☐☐☐☐☐

Sample 3: ☐☐☐☐☐☐

1. ☐☐☐☐

2. ☐☐☐☐

3. ☐☐☐☐☐

4. ☐☐☐☐☐

5. ☐☐☐☐☐☐

6. ☐☐☐☐☐☐

7. ☐☐☐☐☐☐☐

8. ☐☐☐☐☐☐☐

9. ☐☐☐☐☐☐☐

10. ☐☐☐☐☐☐☐

11. ☐☐☐☐☐☐☐☐

12. ☐☐☐☐☐☐☐☐

13. ☐☐☐☐☐☐☐☐

14. ☐☐☐☐☐☐☐☐

15. ☐☐☐☐☐☐☐☐☐

16. ☐☐☐☐☐☐☐☐☐

Part B

Directions: Watch carefully while some words are flashed. Each word will be flashed just once. There is a small box for each letter in the word. Fill in as many boxes as you can. To be considered correct, the letters must be in the right boxes. If you see the first part of the word and the last part but do not see the middle part, fill in all the letters which you saw. Try to put them in the right squares.

Sample 1: [ ][ ][ ]

Sample 2: [ ][ ][ ][ ][ ][ ]

Sample 3: [ ][ ][ ][ ][ ][ ]

1. [ ][ ][ ][ ]

2. [ ][ ][ ][ ]

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16. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

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WORD ANALYSIS TEST
for
JUNIOR-SENIOR HIGH SCHOOL

Directions for Administering

Pass out the test booklets with instructions not to open them until the signal is given.

Say: "In the space at the top of the page write your last name and then your first name. Write today's date (give it). Write the name of your school and the name of your city or town. Write your age in the next space. Then write the month and day of your birthday. Write your grade in school. Underline Boy if you are a boy. Underline Girl if you are a girl."

After the pupils have completed the data called for, read the next directions with them. Expose the card containing mescal in full view of all the pupils for 5 seconds. Then expose the card containing phenazine in full view of all the pupils for 5 seconds. Say: Is there anyone who cannot see easily?" Rearrange seating of pupils if necessary. Read with them the next directions.

Say: "Listen carefully and circle exactly what I say." In pronouncing the words, use an ordinary tone of voice with no special emphasis. Pause for 2 seconds between each two words.

Say: "Ready. In the first line, circle the word make." Pause. "In the second line, circle the word fail." Pause. "In the third line, circle the word candle."

Say: "Now you are ready for the directions. Read them to yourselves while I read them to you." Read with the pupils the directions on the outside of the test booklet.

Say: "We shall now do some sample exercises together so that you will know just how to do the first part of the test. Look at Sample 1. I am going to pronounce a word. Circle all the sounds which you hear either at the beginning or at the end of the word which I pronounce. The first word is pentad. Now circle the sounds which you heard at the beginning or the end of pentad." Allow 5 seconds for pupils to circle the sounds. Then say: "Did you circle d and p?"

Say: We shall do the other samples in the same way. The second sample is kyrine (kī′rĭn)." Pause for five seconds. Say: "Did you all circle k and n? The third sample is insensate (ĭn sĕn′ sāt)." Pause for five seconds. Then say: "Did you all circle t? The fourth sample is hydriodide (hī drī′ō dīd)." Pause for five seconds. Then say: "Did you all circle d and h? The fifth sample is octave." Pause for five seconds.

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Say: "Listen carefully and circle exactly what I say." In pronouncing the words, use an ordinary tone of voice with no special emphasis. Pause for 2 seconds between each two words.

Say: "Ready. In the first line, circle the word make." Pause. "In the second line, circle the word fail." Pause. "In the third line, circle the word candle."

Say: "Now you are ready for the directions. Read them to yourselves while I read them to you." Read with the pupils the directions on the outside of the test booklet.

Say: "We shall now do some sample exercises together so that you will know just how to do the first part of the test. Look at Sample 1. I am going to pronounce a word. Circle all the sounds which you hear either at the beginning or at the end of the word which I pronounce. The first word is pentad. Now circle the sounds which you heard at the beginning or the end of pentad." Allow 5 seconds for pupils to circle the sounds. Then say: "Did you circle d and p?"

Say: We shall do the other samples in the same way. The second sample is kyrine (kī′rīn)." Pause for five seconds. Say: "Did you all circle k and n? The third sample is insensate (ĭn sĕn′sāt)." Pause for five seconds. Then say: "Did you all circle t? The fourth sample is hydriodide (hī drī′ō dīd)." Pause for five seconds. Then say: "Did you all circle d and h? The fifth sample is octave." Pause for five seconds.

Then say: "Did you all circle v? Notice that you may have one sound or two to circle. There will always be at least one sound which you will have to circle."

Say: "Are there any questions?" Pause to answer questions. Then say: "Now we are ready to begin. Open your books to Test I, Part A. Listen as carefully as you can. Look at your papers instead of at me so you will not lose your place."

Test I, Part A

Read with the pupils the directions for Test I, Part A. Allow 5 seconds after each word before going on to the next word. Pronounce each word just once. In each case, read the number of the item before reading the word itself.

1.	rhabdite	(răb´ dīt)
2.	spicule	(spĭk´ ūl)
3.	mastiff	(măs´ tĭf)
4.	widgeon	(wĭj´ ŭn)
5.	poristic	(pō rĭs´ tĭk)
6.	gustative	(gŭs´ tə tĭv)
7.	chamfer	(chăm´ fẽr)
8.	jadish	(jăd´ ĭsh)

Say: "Now we will start listening for sounds in the middle of words as well as for sounds at the beginning and at the end. I am going to do two samples with you. Listen for the word which I shall say and circle all the sounds you heard in the word. Sample 1 is the word bilander (bĭ´ lăn dẽr)." Pause for five seconds. Then say: "Did you circle b, d, l, r? Now listen to Sample 2: shalloon (shə lōōn)." Pause for five seconds. Then say: "Did you circle sh, l? Listen carefully and circle all sounds you hear at the beginning, at the end, or in the middle of these words."

9.	fencible	(fĕn´ sĭ b'l)
10.	zirconium	(zẽr kō´ nĭ ŭm)
11.	shammock	(shăm´ ŭk)
12.	vector	(vĕk´ tẽr)
13.	sedile	(sĕ´ dī´ lē)

Then say: "Did you all circle v? Notice that you may have one sound or two to circle. There will always be at least one sound which you will have to circle."

Say: "Are there any questions?" Pause to answer questions. Then say: "Now we are ready to begin. Open your books to Test I, Part A. Listen as carefully as you can. Look at your papers instead of at me so you will not lose your place."

Test I, Part A

Read with the pupils the directions for Test I, Part A. Allow 5 seconds after each word before going on to the next word. Pronounce each word just once. In each case, read the number of the item before reading the word itself.

1. rhabdite	(răb´ dīt)
2. spicule	(spĭk´ ūl)
3. mastiff	(măs´ tĭf)
4. widgeon	(wĭj´ ŭn)
5. peristic	(pō´ rĭs´ tĭk)
6. gustative	(gŭs´ tā tĭv)
7. chamfer	(chăm´ fēr)
8. jadish	(jăd´ ĭsh)

Say: "Now we will start listening for sounds in the middle of words as well as for sounds at the beginning and at the end. I am going to do two samples with you. Listen for the word which I shall say and circle all the sounds you heard in the word. Sample 1 is the word bilander (bĭ´ lăn dēr)." Pause for five seconds. Then say: "Did you circle b, d, l, r? Now listen to Sample 2: shalloon (shă lōōn´)." Pause for five seconds. Then say: "Did you circle sh, l? Listen carefully and circle all sounds you hear at the beginning, at the end, or in the middle of these words."

9. fencible	(fĕn´ sĭ b'l)
10. zirconium	(zĕr kō´ nĭ ŭm)
11. shammock	(shăm´ ŭk)
12. vector	(vĕk´ tēr)
13. sedile	(sē´ dī lē)

14. disvelop (dĭs vĕl´ ŭp)

15. morbific (môr bĭf´ ĭk)

16. biangulated (bī ăn´ gŭ lāt ĕd)

Say: "Now we will listen for blends as well as for single sounds. A blend is a combination of sounds, like the bl at the beginning of blue or the nd at the end of round. This time, circle all the single sounds and also all the blends which you hear. The first sample is brushhook." Pause for five seconds. Then say: "Did you circle br, h, and sh? The second sample is presagement." Pause for five seconds. Then say: "Did you circle nt, pr, and m? Listen carefully and circle all the single sounds and all the blends which you hear in these words."

17. transept (trăn´ sĕpt)

18. sludge (slŭj)

19. protoplast (prō´ tŏ plăst)

20. sentient (sĕn´ shĕnt)

21. fluigram (flōō´ ĭ grăm)

22. hydrothorax (hī´ drŏ thō´ răks)

23. theanthropism (thē´ ăn´ thrŏ´ pĭz'm)

24. nudging (nŭj´ ĭng)

Say: Now we will listen for vowel sounds as well as for single consonant sounds and blends. The vowels are a, e, i, o, u. This time, circle all the single consonant sounds and blends and also all the vowel sounds which you hear. The first sample is frănchĭsăl." Pause for five seconds. Then say: "Did you circle a, fr, z? The second sample is negotiate (nē´ gō´ shĭ āt)." Pause for five seconds. Then say: "Did you circle sh, o? The third sample is thiocyanic (thī´ ō´ sī´ ăn´ ĭk)." Pause for five seconds. Then say: "Did you circle i, a, s, th? Now listen carefully and circle all the single consonant sounds and blends and also all the vowel sounds you hear."

25. blisterwort (blĭs´ tĕr wûrt)

26. swag (swăg)

27. wheelhouse (hwēl´ hous)

28. skewbald (skū´ bôld)

29. tunicle (tū´ nĭ k'l)

14. disvelop (dĭs vĕl ŭp)

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27. wheelhouse (hwēl hous)

28. skewbald (skū bôld)

29. tunicle (tū nĭ k'l)

30. lampern (lăm´ pĕrn)

31. cataloguize (kăt´ ȧ lŏg īz)

32. sponsible (spŏn´ sĭ bl)

33. yarwhelp (yär´ hwĕlp)

34. fructiform (frŭk´ tĭ fôrm)

35. unsheathe (ŭn shē~~th~~´)

36. encroach (ĕn krōch´)

37. twiningly (twīn´ ĭng lĭ)

38. lanyard (lăn´ yĕrd)

39. inglobe (ĭn glōb´)

40. palimpsest (păl´ ĭmp sĕst)

41. posthaste (pōst hāst´)

42. stasiarch (stā´ sĭ ärk)

Part B

Read with the pupils the directions for Test I, Part B. Then say: "We shall do some samples first. I shall pronounce two words. You are to circle the one word on your paper which contains the same vowel sound as the two words I pronounce. Look at Sample 1. The words are hag, mal. Circle the word which has the same vowel sound as hag, mal." Pause for two seconds. Say: "Did you all circle pan? Listen for Sample 2. The words are ken, teff." Pause for two seconds. Say: "Did you all circle get? The rest of the exercise is done in the same way. Listen."

1. hack, raff

2. sol, hob

3. lex, dell

4. vug, mull

5. dib, rick

6. mell, hent

7. hap, flan

30. lamporn (lăm pŏrn)

31. catalogulse (kăt ă lŏg īz)

32. sponsible (spŏn sĭ bl)

33. yarwhelp (yăr hwĕlp)

34. fructiform (frŭk tĭ fôrm)

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1. hack, raff

2. sol, hob

3. lex, dell

4. vug, mull

5. dib, rick

6. mell, heut

7. hap, flan

8. prill, gid

9. nock, holl

10. reft, helve

11. miff, blick

12. scud, cusp

Test II

Read the directions with the pupils. Say: "We shall do the samples together. Listen while I pronounce the word. I shall say it only once. Then you will circle the number which corresponds to the number of syllables which you heard in the word. Sample 1 is nigritude (nĭg´ rĭ tūd)."

Allow 2 seconds for pupils to circle a number. Say: "Did you circle the number 3? Now we shall do Sample 2. The word is orientation." Pause for 2 seconds. Then say: "Did you circle 5? Are there any questions?"

Allow time for questions.

Then say: "Do all the rest of the parts of this test in the same way. Listen." Precede each word as it is pronounced with the number of the item.

1. orotund (ō´ rō tŭnd)

2. crimination

3. pone

4. overcapitalize

5. microclimatology

6. moly (mō´ lĭ)

7. extraditable (ĕks trȧ dī´ tȧ b'l)

8. lope

9. neuropsychosis

10. parliamentarian

8. prill, gid

9. nock, holl

10. reft, helve

11. miff, blick

12. scud, cusp

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8. lope

9. neuropsychosis

10. parliamentarian

Test III

Read the directions with the pupils. Say: "Notice number 1. P, long e, z spells the peas which grow in the garden, so you write 1. peas in the list of vegetables. Look at number 2. L, short a, m spells lamb, so you write 2. lamb in the list of animals. Look at number 3. K, w, short o, r, short i spells quarry, so you write 3. quarry in the list of places. Each time you are to spell the word as it is usually spelled. Write clearly. Write the number of the word as well as the word itself. Are there any questions?" Pause for questions. "You will have 4 minutes to work on this test. Ready. Go." At the end of 4 minutes, say: "Stop!"

Test IV

Read the directions with the pupils. Then say: "Now we shall do some samples together. The first sample is sut." Pause for 5 seconds. Then say: "Did you put the letters s u t in the boxes? The second sample is poltin." Pause for 5 seconds. Then say: "Did you put the letters p o l t i n in the boxes? The third sample is hoptig." Pause for 5 seconds. Then say: "Did you put the letters h o p t i g in the boxes? The rest of the exercise is done in the same way. I am going to stand in the back of the room so that you will get the sounds entirely through your ears and not by watching my lips. Write clearly. Listen."

1. mip	9. delnar	17. lithcrim
2. ref	10. gloftib	18. swurmchet
3. yad	11. weskift	19. ganclarp
4. vost	12. jorkbesh	20. hildprek
5. dring	13. stregwis	21. chimrund
6. grelb	14. spadhink	22. blunwhaz
7. sterf	15. shandpeth	23. zanjant
8. flarn	16. whortven	24. plunyerl

Test V

Part A Read the directions with the pupils. Then say: "Look carefully while I flash the first sample. Ready. Sample 1." Flash fish. Pause for 2 seconds. Then say: "Did you all circle fish?" Continue in the same way through the remaining five samples. Then say: "The rest of the exercise is done in the same way." Flash each card. Pause for 2 seconds after each flash. Then say: "Ready. Number _____."

Part B Read the directions with the pupils. Then say: Even if you

Test III

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7. sterf	15. shandpeth	23. zanjant
8. flarn	16. whortven	24. plunyerl

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Part A Read the directions with the pupils. Then say: "Look carefully while I flash the first sample. Ready. Sample 1." Flash fish. Pause for 2 seconds. Then say: "Did you all circle fish?" Continue in the same way through the remaining five samples. Then say: "The rest of the exercise is done in the same way." Flash each card. Pause for 2 seconds after each flash. Then say: "Ready. Number _____."

Part B Read the directions with the pupils. Then say: Even if you

do not see all the letters, write the ones you do see and try to put them in the right boxes. You will receive credit for each letter which is correct and in the right box. Look carefully while I flash Sample 1." Flash ope. Pause for 6 seconds. Then say: "Did you fill the boxes with o p e?" Continue in this way for the remaining two samples. Then say: "The rest of this exercise is done in the same way." Flash each card. Pause 6 seconds after each flash. Then say: "Ready. Number _____."

Words Flashed

Part A	Part B
1. soft	1. node
2. corn	2. tung
3. fist	3. spiel
4. junk	4. prase
5. cradle	5. sepsis
6. polish	6. cornel
7. device	7. mattoid
8. relate	8. mandrel
9. fusible	9. modulus
10. visible	10. piscary
11. general	11. purslane
12. wanderer	12. ornithic
13. veritable	13. japonica
14. foliation	14. isogonic
15. geography	15. narratory
16. personator	16. matricula
17. comparative	17. illuminati
18. meteoristic	18. gigantology
19. heterography	19. nitromuriate
20. reconcilable	20. sustentacular

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Words Flashed

Part A	Part B
1. soft	1. node
2. corn	2. tung
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5. cradle	5. sepsis
6. polish	6. cornel
7. device	7. mattoid
8. relate	8. mandrel
9. fusible	9. modulus
10. visible	10. piscary
11. general	11. purslane
12. wanderer	12. ornithic
13. veritable	13. japonica
14. foliation	14. isogonic
15. geography	15. narratory
16. personator	16. matricula
17. comparative	17. illuminati
18. meteoristic	18. gigantology
19. heterography	19. nitromuriate
20. reconcilable	20. sustentacular

INDIVIDUAL WORD PRONUNCIATION TEST

Name _____ Date _____

Word	Mispronunciation	Substitution	Phonetic Pronunciation	Refused
1. flamingo				
2. russet				
3. vehicle				
4. nomad				
5. dauntless				
6. caldron				
7. assent				
8. unkempt				
9. bequeath				
10. frenzied				
11. menu				
12. saccharine				
13. simultaneous				
14. divert				
15. reverent				
16. agile				
17. dastardly				
18. savor				
19. badger				
20. tart				
21. loathe				
22. spouse				

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14. divert				
15. reverent				
16. agile				
17. dastardly				
18. savor				
19. badger				
20. tart				
21. loathe				
22. spouse				

Word	Mispronunciation	Substitution	Phonetic Pronunciation	Refused
23. wary				
24. adder				
25. jargon				
26. plausible				
27. zephyr				
28. horde				
29. apprehension				
30. calk				
31. swarthy				
32. exhilarate				
33. hew				
34. acquiescence				
35. brogan				
36. gore				
37. frugal				
38. equanimity				
39. contiguous				
40. gratuity				
41. galactose				
42. nitrify				
43. kenosis				
44. polyglot				
45. sebaceous				
46. subrogation				

Word	Mispronunciation	Substitution	Phonetic Pronunciation	Refused
23. wary				
24. adder				
25. jargon				
26. plausible				
27. zephyr				
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29. apprehension				
30. calk				
31. swarthy				
32. exhilarate				
33. hew				
34. acquiescence				
35. brogan				
36. gore				
37. frugal				
38. equanimity				
39. contiguous				
40. fratuity				
41. galactose				
42. nitrify				
43. kenosis				
44. polyglot				
45. sebaceous				
46. subrogation				

Word	Mispronunciation	Substitution	Phonetic Pronunciation	Refused
47. auricular				
48. opprobrium				
49. hysography				
50. scansorial				
51. reverberation				
52. electrostatics				
53. valedictory				
54. intercolumnar				
55. astrophysical				
56. parthenogenetic				
57. semicentennial				
58. confabulatory				
59. hypercatalectic				
60. litiscontestation				

Word	Mispronunciation	Substitution	Phonetic Pronunciation	Refused
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49. hydrography				
50. scanaorial				
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54. intercolumnar				
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60. litiscontestation				

SPELLING TEST FOR MAIN STUDY[1/]

Directions for administering: Pronounce the word. Read the sentence containing the word. Then pronounce the word again.

1. can	I can go with you.	can
2. old	How old are you?	old
3. ice	He slipped on the ice.	ice
4. his	His arm was broken.	his
5. far	How far are you going?	far
6. glad	I am glad to see you.	glad
7. night	Owls come out at night.	night
8. within	Keep within the law.	within
9. money	How much money have you?	money
10. change	Do not change your position.	change
11. struck	He was struck by lightning.	struck
12. address	Do you know her address?	address
13. known	I have known her a week.	known
14. perhaps	Perhaps you are right.	perhaps
15. against	He fell against the wall.	against
16. investigate	I will investigate for you.	investigate
17. really	Are you really going?	really
18. business	His business is important.	business
19. elaborate	The decorations are elaborate.	elaborate
20. evidence	We have plenty of evidence.	evidence
21. character	He has a good character.	character
22. especially	I am especially happy today.	especially
23. decision	The boy made an excellent decision.	decision
24. recommend	Can you recommend that book?	recommend
25. privilege	It is your privilege to go.	privilege
26. apologize	You will have to apologize.	apologize
27. appropriate	The dress seemed appropriate for you.	appropriate
28. cauliflower	We had cauliflower for dinner.	cauliflower
29. chandelier	We admired the glass chandelier.	chandelier
30. discipline	School discipline is often strict.	discipline
31. fatiguing	We found the work fatiguing.	fatiguing
32. immediately	Please come immediately.	immediately
33. kerosene	Kerosene burns easily.	kerosene
34. mischievous	Kittens are often mischievous.	mischievous

1/First 25 items consist of the odd items of List 2 from J. Cayce Morrison and William A. McCall, Morrison-McCall Spelling Scale. Yonkers-on-Hudson, New York: World Book Company, 1923. Last 9 items are selected from List AA of B. R. Buckingham, Buckingham Extension of the Ayres Spelling Scale. Bloomington, Illinois: Public School Publishing Company.

SPELLING TEST FOR MAIN STUDY[1]

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9. money	How much money have you?	money
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27. appropriate	The dress seemed appropriate for you.	appropriate
28. cauliflower	We had cauliflower for dinner.	cauliflower
29. chandelier	We admired the glass chandelier.	chandelier
30. discipline	School discipline is often strict.	discipline
31. fatiguing	We found the work fatiguing.	fatiguing
32. immediately	Fleas come immediately.	immediately
33. kerosene	Kerosene burns easily.	kerosene
34. mischievous	Kittens are often mischievous.	mischievous

[1] First 25 items consist of the odd items of list 2 from 1. Cayce Morrison and William A. McCall, Morrison-McCall Spelling Scale. Yonkers-on-Hudson, New York: World Book Company, 1923. Last 9 items are selected from List AA of B. R. Buckingham, Buckingham Extension of the Ayres Spelling Scale. Bloomington, Illinois: Public School Publishing Company.

AMERICAN COUNCIL ON EDUCATION

COOPERATIVE ENGLISH TEST

TEST CI: READING COMPREHENSION

(Lower Level)

FORM T

by

FREDERICK B. DAVIS and MARY WILLIS, Cooperative Test Service

with the editorial assistance of

DONALD D. DURRELL, Boston University; DANIEL D. FEDER, Illinois State Civil Service Commission;
WILLIAM S. GRAY, University of Chicago; ARTHUR E. TRAXLER, Educational Records Bureau; and LOUIS C. ZAHNER, Groton School

Please print:

Name.....Date.....
Last First Middle

Grade, Form, or Class.....Age.....Date of Birth.....
Yrs. Mos.

School.....City.....Sex.....
M. or F.

Title of the English course you are now taking.....Instructor.....

General Directions: Do not turn this page until the examiner tells you to do so. This examination consists of two parts, and requires 40 minutes of working time. The directions for each part are printed at the beginning of the part. Read them carefully and proceed at once to answer the questions. DO NOT SPEND TOO MUCH TIME ON ANY ONE ITEM. ANSWER THE EASIER QUESTIONS FIRST; then return to the harder ones if you have time. There is a time limit for each part. If you finish Part I before the time is up, go on to Part II. If you have not finished Part I when the time is up, stop work on that part and proceed at once to Part II. If you finish Part II before the time is up, you may go back and work on either part. No questions may be asked after the examination has begun.

You may answer questions even when you are not perfectly sure that your answers are correct, but you should avoid **wild** guessing, since wrong answers will result in a subtraction from the number of your correct answers.

Part	Minutes
I. Vocabulary	15
II. Reading	25
Total	40

	Scaled Score	Percentile
Vocabulary		
Speed of Comprehension		
Level of Comprehension		

(Sum of Scaled Scores for Parts:)

Total		

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15 Amsterdam Avenue, New York, N. Y.

PART I

VOCABULARY

(15 minutes)

Directions: In each group below, select the numbered word or phrase that **most nearly** corresponds in meaning to the word at the head of that group, and put its **number** in the parentheses at the right. It is quite likely that you will finish this part before the time is up. In that case, **go on immediately to Part II,** because additional time **spent** on Part II will probably improve your Speed of Comprehension Score.

1. **sleet**
   1–1 frozen rain
   1–2 windstorm
   1–3 gravel
   1–4 fine dust
   1–5 light mist . . . . 1( )

2. **broth**
   2–1 cooling drink
   2–2 coarse bread
   2–3 soup
   2–4 pudding
   2–5 medicine . . . . . 2( )

3. **compensation**
   3–1 rest
   3–2 charity
   3–3 payment
   3–4 employment
   3–5 merit . . . . . 3( )

4. **exceed**
   4–1 cut out
   4–2 cast off
   4–3 go beyond
   4–4 depart
   4–5 come to . . . . . 4( )

5. **dazzling**
   5–1 sudden
   5–2 dancing
   5–3 brilliant
   5–4 clever
   5–5 colored . . . . . 5( )

6. **derby**
   kind of
   6–1 scarf
   6–2 hat
   6–3 cane
   6–4 dog
   6–5 horse . . . . . 6( )

7. **metropolis**
   7–1 business section
   7–2 department store
   7–3 opera company
   7–4 large city
   7–5 foreign country . . 7( )

8. **custody**
   8–1 janitor
   8–2 schoolhouse
   8–3 inspection
   8–4 presence of mind
   8–5 safekeeping . . . . 8( )

9. **alfalfa**
   kind of
   9–1 sheep
   9–2 fur
   9–3 plant
   9–4 cloth
   9–5 seasoning . . . . 9( )

10. **whimper**
    10–1 half-suppressed giggle
    10–2 low, whining cry
    10–3 shrill whisper
    10–4 small crib or cradle
    10–5 laundry basket . 10( )

11. **ignite**
    11–1 pay no attention to
    11–2 set on fire
    11–3 build up
    11–4 throw away
    11–5 darken . . . . . 11( )

12. **archer**
    12–1 hunter
    12–2 jumper
    12–3 girder
    12–4 bowman
    12–5 engineer . . . . 12( )

13. **halo**
    13–1 monument
    13–2 angel
    13–3 shrine
    13–4 crucifix
    13–5 ring of light . . 13( )

14. **galley**
    14–1 railroad tunnel
    14–2 ship's kitchen
    14–3 pulley
    14–4 spectators
    14–5 corridor . . . . 14( )

15. **prop**
    15–1 support
    15–2 ridge
    15–3 wooden peg
    15–4 handle
    15–5 brush . . . . . 15( )

16. **delirious**
    16–1 good to eat
    16–2 raving
    16–3 beautiful
    16–4 dying
    16–5 moving rapidly . 16( )

17. **utterly**
    17–1 slightly
    17–2 completely
    17–3 openly
    17–4 mistakenly
    17–5 secretly . . . . 17( )

18. **salvage**
    18–1 improve
    18–2 destroy
    18–3 rescue
    18–4 encourage
    18–5 consider . . . . 18( )

19. **tinge**
    19–1 slight trace
    19–2 feeling of regret
    19–3 thin coating of metal
    19–4 funeral song
    19–5 increasing darkness . . . . . 19( )

20. **dawdle**
    20–1 diminish
    20–2 make jokes
    20–3 pamper
    20–4 waste time
    20–5 shove . . . . . 20( )

Go on to the next page.

21. flamingo
21–1 long-legged water bird
21–2 a variety of flat-fish
21–3 Spanish dance
21–4 poisonous climbing vine
21–5 tropical, sheep-like animal . . . 21( )

22. russet
22–1 ripe
22–2 soft
22–3 glowing
22–4 deep purple
22–5 reddish-brown . 22( )

23. vehicle
23–1 obstacle
23–2 garment
23–3 heavenly body
23–4 conveyance
23–5 screw . . . . . 23( )

24. nomad
24–1 lonely
24–2 savage
24–3 wandering
24–4 rural
24–5 gentle . . . . . 24( )

25. dauntless
25–1 automatic
25–2 courageous
25–3 rude
25–4 splendid
25–5 defenseless . . . 25( )

26. caldron
26–1 large kettle
26–2 bonfire
26–3 pit
26–4 maze
26–5 hot liquid . . . 26( )

27. assent
27–1 deny
27–2 retard
27–3 deliver
27–4 rest
27–5 agree . . . . . 27( )

28. unkempt
28–1 unsuitable
28–2 irritable
28–3 irregular
28–4 depressed
28–5 untidy . . . . . 28( )

29. bequeath
29–1 crawl under
29–2 leave in one's will
29–3 discharge without warning
29–4 conceal carefully
29–5 accumulate . . . 29( )

30. frenzied
30–1 ragged
30–2 fringed
30–3 fried in butter
30–4 wildly excited
30–5 perplexed . . . 30( )

31. menu
31–1 theater program
31–2 reminder
31–3 brief letter
31–4 bill of fare
31–5 men's club . . . 31( )

32. saccharine
32–1 very sweet
32–2 dull
32–3 stimulating
32–4 light in weight
32–5 frivolous . . . . 32( )

33. simultaneous
33–1 occurring in succession
33–2 immediate
33–3 operating automatically
33–4 happening at the same time
33–5 harmonious . . . 33( )

34. divert
34–1 divide
34–2 release
34–3 turn around
34–4 turn aside
34–5 bother . . . . . 34( )

35. reverent
35–1 dreamy
35–2 peaceful
35–3 pleasant
35–4 old
35–5 respectful . . . 35( )

36. agile
36–1 tired
36–2 old
36–3 nimble
36–4 light
36–5 careless . . . . 36( )

37. dastardly
37–1 cruel
37–2 illegal
37–3 hasty
37–4 careless
37–5 cowardly . . . . 37( )

38. savor
38–1 reject
38–2 make last
38–3 select
38–4 feel
38–5 taste . . . . . 38( )

39. badger
kind of
39–1 grain
39–2 card game
39–3 machine
39–4 walking shoe
39–5 animal . . . . . 39( )

40. tart
40–1 deep
40–2 yellowish-red
40–3 mild
40–4 delicious
40–5 sour . . . . . 40( )

41. loathe
41–1 mistrust
41–2 soothe
41–3 disclaim
41–4 abhor
41–5 need . . . . . 41( )

42. spouse
42–1 small insect
42–2 fur-bearing animal
42–3 husband or wife
42–4 close friend or relation
42–5 enemy . . . . . 42( )

43. wary
43–1 warlike
43–2 tired
43–3 mean
43–4 hopeful
43–5 cautious . . . . 43( )

44. adder
kind of
44–1 snake
44–2 fish
44–3 bird
44–4 spider
44–5 dog . . . . . 44( )

Go on to the next page.

45. jargon
45–1 meaningless talk
45–2 flowerpot
45–3 perfume
45–4 leopard
45–5 close-fitting jacket . . . . . 45( )

46. plausible
46–1 genuine
46–2 appearing reasonable
46–3 easy to understand
46–4 definite
46–5 praiseworthy . . 46( )

47. zephyr
47–1 wild animal
47–2 gentle wind
47–3 passing thought
47–4 garden plant
47–5 bluish-white metal . . . . . 47( )

48. horde
48–1 waterfall
48–2 nation
48–3 desert
48–4 hiding place
48–5 crowd . . . . . 48( )

49. apprehension
49–1 regret
49–2 dread
49–3 attachment
49–4 suffering
49–5 gratitude . . . . 49( )

50. calk
50–1 fill seams of a boat
50–2 be eager for a fight
50–3 boast
50–4 refuse to work
50–5 call for help . . 50( )

51. swarthy
51–1 angry
51–2 strong
51–3 covered with hair
51–4 greasy
51–5 dark-complexioned . . . . . 51( )

52. exhilarate
52–1 enliven
52–2 breathe out
52–3 laugh
52–4 hasten
52–5 swell up . . . . 52( )

53. hew
53–1 plant
53–2 fix
53–3 chop
53–4 hoe
53–5 reap . . . . . 53( )

54. acquiescence
54–1 assent
54–2 accompaniment
54–3 praise
54–4 peacefulness
54–5 laziness . . . . 54( )

55. brogan
55–1 bog
55–2 heavy shoe
55–3 blunt instrument
55–4 Irish folksong
55–5 wooden bowl . . 55( )

56. gore
56–1 male pig
56–2 anger
56–3 blood
56–4 hatred
56–5 narrow passage . 56( )

57. frugal
57–1 poor
57–2 contrary
57–3 tidy
57–4 economical
57–5 wasteful . . . . 57( )

58. equanimity
58–1 composure
58–2 equivalence
58–3 wisdom
58–4 tastelessness
58–5 deceit . . . . . 58( )

59. contiguous
59–1 communicable
59–2 going on over a long period
59–3 adjoining
59–4 disagreeable
59–5 dependent . . . 59( )

60. gratuity
60–1 mistake
60–2 thankfulness
60–3 good luck
60–4 tip
60–5 prayer . . . . . 60( )

Go on to the next part.

Number wrong	0–2	3–6	7–10	11–14	15–18	19–22	23–26	27–30	31–34	35–38	39–42	43–46	47+
Amount to be subtracted	0	1	2	3	4	5	6	7	8	9	10	11	12

Number right_____

Subtract_____
(See table above)

Raw Score = Difference_____

Scaled Score_____
(See table on key)

PART II: READING

(25 minutes)

Directions: This part consists of selections taken from stories, articles, humorous anecdotes, textbooks, etc. Following each passage are several multiple-choice items concerning the selection. In each case you are to **read the selection carefully first,** and then decide on the basis of the selection which one of the choices given after each incomplete statement best completes the meaning of the statement. If you cannot decide, you may go back to the passage. Put the **number** of your choice in the parentheses at the right of each item. Since this test measures Speed of Comprehension as well as Level of Comprehension, enough material has been included so that even the most rapid readers probably will not finish in the time allowed.

"Alice!" called a voice.

The effect on the reader and her listener, both of whom were sitting on the floor, was instantaneous. Each started and sat rigidly intent for a moment; then, as the sound of approaching footsteps was heard, one girl hastily slipped a little volume under the coverlet of the bed, while the other sprang to her feet and in a hurried, flustered way pretended to be getting something out of a tall wardrobe.

Before the one who hid the book had time to rise, a woman of fifty entered the room, and after a glance, cried, "Alice! How often have I told you not to sit on the floor?"

"Very often, Mommy," said Alice, rising meekly, meantime casting a quick glance at the bed to see how far its smoothness had been disturbed.

"And still you continue such unbecoming behavior."

"Oh, Mommy, but it is so nice!" cried the girl. "Didn't you like to sit on the floor when you were fifteen?"

1. Alice's companion was apparently
   1–1 a girl.
   1–2 her brother.
   1–3 her pet cat.
   1–4 the family dog.
   1–5 a doll. . . . . 1( )

2. When Alice heard the approaching footsteps, she was principally
   2–1 happy.
   2–2 angry.
   2–3 alarmed.
   2–4 puzzled.
   2–5 amused. . . . . 2( )

3. We may infer that Alice is
   3–1 rarely disobedient.
   3–2 unable to read.
   3–3 very much in love.
   3–4 a spoiled child.
   3–5 fifteen years of age. . . . . 3( )

4. When she heard her name called, Alice was evidently
   4–1 reading to herself.
   4–2 reading aloud.
   4–3 lying in bed.
   4–4 dressing.
   4–5 making her bed. . . . . 4( )

5. Alice was worried about the appearance of the bed because
   5–1 she had neglected to make it up.
   5–2 her companion had been sitting on it.
   5–3 her companion was hiding under it.
   5–4 she had piled several books on it.
   5–5 she was afraid her mother might find the book. . . . . 5( )

- - - - - - - - - - - - -

The crawl stroke was not generally known in Great Britain until 1902, when Richard Cavill came from Australia to compete in the English swimming championships. It had been common among the natives of the South Sea Islands for many years and was introduced into Australia about 1900. The earliest knowledge of the crawl obtained by Americans was gleaned from hazy newspaper descriptions of Cavill's stroke. In attempting to imitate the stroke, Americans developed a faster leg drive, making four scissoring kicks per stroke instead of the two made by Cavill. The new leg drive was combined by Americans with the double overarm action of the trudgen; the resulting stroke was called the four-beat crawl to distinguish it from the two-beat Australian crawl.

6. The earliest form of the crawl stroke probably originated in
   6–1 Australia.
   6–2 England.
   6–3 the United States.
   6–4 the South Sea Islands.
   6–5 Hawaii. . . . . 6( )

7. The four-beat crawl was
   7–1 first used by Richard Cavill.
   7–2 first used by natives of the South Sea Islands.
   7–3 superseded by the two-beat crawl.
   7–4 a combination of other strokes.
   7–5 first used in the trudgen stroke. . . . 7( )

8. The four-beat crawl was apparently developed in
   8–1 Australia before 1902.
   8–2 England before 1902.
   8–3 Australia after 1902.
   8–4 England after 1902.
   8–5 America after 1902. . . . . 8( )

Go on to the next page.

9. When Cavill first used the crawl stroke in England,
   9–1 no one in England had ever heard of it.
   9–2 very few people in England knew of it.
   9–3 only Australians used it.
   9–4 it was mistaken for the trudgen stroke.
   9–5 it was already commonly used in America. . . . . 9( )

10. When Americans first heard of the crawl stroke, they
   10–1 tried to find ways of improving it.
   10–2 tried to imitate it.
   10–3 compared it with the trudgen stroke.
   10–4 ridiculed it.
   10–5 studied its every detail before trying it. . . . . 10( )

- - - - - - - - - - - - -

The only difference between hormones and vitamins is that hormones originate inside the plant that uses them, while vitamins are manufactured outside by various molds and bacteria, and are fed into the plant through the roots. Chemically, a hormone and a vitamin may be identical. Thus a plant, stunted because of a deficiency of a hormone, may be changed into a profuse grower by being fed the right vitamin.

Plant growth depends on a hormone produced in the green leaves of a plant and carried back to the roots to make larger root systems to feed more plant. It is called auxin. The vitamin counterpart of this hormone is B_1, chemically known as thiamine.

11. According to the passage, thiamine if given to a plant will
   11–1 change its cellular structure.
   11–2 cause radical changes in the next generation.
   11–3 stunt its growth.
   11–4 cause it to grow more rapidly.
   11–5 cause it to produce a larger amount of auxin. . . . . 11( )

12. Auxin is produced mainly in the
   12–1 roots.
   12–2 stems.
   12–3 flowers.
   12–4 soil.
   12–5 leaves. . . . . 12( )

13. The passage states that hormones and vitamins differ with respect to their
   13–1 effect on plant growth.
   13–2 presence in animal tissues.
   13–3 rarity.
   13–4 sources.
   13–5 chemical composition. . . . . 13( )

14. Plants obtain vitamins mainly through their
   14–1 leaves.
   14–2 stems.
   14–3 flowers.
   14–4 fruits.
   14–5 roots. . . . . 14( )

15. Auxin aids plant growth by
   15–1 producing green leaves.
   15–2 forming a protection against molds and bacteria.
   15–3 causing enlargement of the root systems.
   15–4 carrying oxygen to the roots.
   15–5 producing thiamine. . . . . 15( )

16. From this passage alone, we cannot tell whether
   16–1 thiamine has any effect on plants.
   16–2 auxin is beneficial to animals.
   16–3 vitamins have any effect on plant growth.
   16–4 hormones and vitamins are similar in origin.
   16–5 certain vitamins correspond to certain hormones. . . . . 16( )

17. The best title for this passage would be
   17–1 Plant Hormones.
   17–2 The Chemistry of Plants.
   17–3 Plant Growth.
   17–4 Plant Vitamins.
   17–5 Plant Hormones and Vitamins. . . 17( )

- - - - - - - - - - - - -

Benjamin Franklin once arrived at an inn in Baltimore on a very cold night to find all the best places around the fire occupied. Sitting down near a window, he loudly called a servant and ordered him to open a dozen oysters and take them out to his horse. The guests, agog with curiosity, went out to see the animal with the wonderful appetite, but they soon returned complaining that the horse would pay no attention to the oysters. By that time Franklin was settled in the warmest chair, and stretching himself lazily he replied, "In that case bring them to me and give him some oats."

18. Franklin ordered the oysters taken to his horse because
   18–1 the horse had formerly liked oysters.
   18–2 he hoped to get them for himself without paying for them.
   18–3 he wanted a chair by the fire.
   18–4 he enjoyed making people curious.
   18–5 he wanted to attract attention to himself. . . . . 18( )

19. The writer wants to indicate that Benjamin Franklin was
   19–1 lazy.
   19–2 selfish.
   19–3 vain.
   19–4 famous.
   19–5 clever. . . . . 19( )

20. Franklin was apparently
   20–1 not surprised that the horse refused to eat the oysters.
   20–2 surprised when the guests went out to see his horse.
   20–3 sorry that he would have to eat the oysters himself.
   20–4 sorry that the horse would not eat the oysters.
   20–5 playing a joke on the servant at the inn. . . . . 20( )

- - - - - - - - - - - - -

Go on to the next page.

The colonists are men; the colonists are therefore free born; for, by the law of nature, all men are free born, white or black. No good reason can be given for enslaving those of any color. Is it right to enslave a man because his color is black, or his hair short, and curled like wool, instead of Christian hair? Can any logical inference in favor of slavery be drawn from a flat nose or a short face? The riches of the West Indies or the luxury of the metropolis should not have weight to break the balance of truth and justice. Liberty is the gift of God and cannot be annihilated.

21. The writer appears to be
- 21–1 certain that he is right.
- 21–2 uncertain of his opinions.
- 21–3 a slave.
- 21–4 a colonist.
- 21–5 eager for information. . . . . 21( )

22. According to the passage, the right to freedom is
- 22–1 something that man must earn by his own efforts.
- 22–2 bestowed on man by law.
- 22–3 established beyond the powers of law.
- 22–4 not extended to women.
- 22–5 responsible for man's attainment of wealth. . . . . 22( )

23. The writer suggests that slavery resulted from
- 23–1 the breakdown of religion.
- 23–2 the desire for wealth.
- 23–3 conquest by force of arms.
- 23–4 differences in men's places of birth.
- 23–5 the founding of the West Indian colonies. . . . . 23( )

24. The main thought of this passage is that
- 24–1 there is no justification for slavery.
- 24–2 only women can be held as slaves.
- 24–3 there is a sound legal basis for slavery.
- 24–4 liberty is a gift of God.
- 24–5 colonists are free born. . . . . 24( )

- - - - - - - - - - - - -

As to clever people's hating each other, I think a little extra talent does sometimes make people jealous. They become irritated by perpetual attempts and failures, and it hurts their tempers and dispositions. Unpretending mediocrity is good, and genius is glorious; but a weak flavor of genius in an essentially common person is detestable. It spoils the grand neutrality of a commonplace character, as the rinsings of an unwashed wineglass spoil a draught of fair water. No wonder the poor fellow

(*Continued in next column*)

(*Continued from preceding column*)

who belongs to this class of slightly favored mediocrities is puzzled and vexed by the strange sight of a dozen men of high capacity working and playing together in harmony.

25. The writer suggests that persons of exceptionally great ability
- 25–1 tend to like and appreciate one another.
- 25–2 are unable to work together.
- 25–3 dislike the company of ordinary men.
- 25–4 are likely to be jealous of one another.
- 25–5 are essentially common except for their genius. . . . . 25( )

26. He also suggests that talented people sometimes have jealous natures because they
- 26–1 care more for their work than for human relationships.
- 26–2 do not attempt to control their feelings.
- 26–3 have had too much disappointment.
- 26–4 have had little opportunity to know each other.
- 26–5 have only neutral characters. . . . 26( )

27. The author of this passage increased its effectiveness by the use of
- 27–1 description of individual personalities.
- 27–2 a striking comparison.
- 27–3 appeal to tradition.
- 27–4 subtle flattery of the reader.
- 27–5 Biblical allusion. . . . . 27( )

28. The writer's attitude toward completely commonplace persons is one of
- 28–1 contempt.
- 28–2 suspicion.
- 28–3 impatience.
- 28–4 respect.
- 28–5 envy. . . . . 28( )

29. The writer apparently prefers
- 29–1 ordinary men to geniuses.
- 29–2 harmony to ability.
- 29–3 slightly gifted men to geniuses.
- 29–4 water to alcoholic drinks.
- 29–5 ordinary men to slightly gifted men. 29( )

30. Which one of the following proverbs expresses somewhat the same thought as the passage above?
- 30–1 A little learning is a dangerous thing.
- 30–2 Much learning doth make thee mad.
- 30–3 Good sense travels on the well-worn paths; genius, never.
- 30–4 Genius does what it must, and talent does what it can.
- 30–5 None think the great unhappy but the great. . . . . 30( )

* * * * * * * *

Go on to the next page.

Did you ever hear of a bird that acts as a toothpick? It's called the zick-zack. It picks leeches and other parasites from the crocodile's mouth, and acts as a sentinel for the reptile, too.

The zick-zack is a member of the plover family. The plovers are small shore birds about twelve inches long, being plumper and stubbier than the snipes and having shorter, thicker necks. The golden plover is the most beautiful and the most traveled member of the plover family. Golden plovers breed in northern Canada in the summer but spend their winters in Brazil and Argentina, making the trips in nonstop flights across thousands of miles of land and water.

31. We might expect to find plovers flying northward across the United States in
- 31–1 February.
- 31–2 April.
- 31–3 July.
- 31–4 October.
- 31–5 December. . . . . 31( )

32. The golden plover is noted for his
- 32–1 attachment to crocodiles.
- 32–2 ability to fly long distances.
- 32–3 short, thick neck.
- 32–4 peculiar appearance.
- 32–5 unusual breeding places. . . . . 32( )

33. The writer asks a question in the first sentence of the passage mainly in order to
- 33–1 find out what the reader knows.
- 33–2 show what the passage is about.
- 33–3 get some information about the zick-zack.
- 33–4 arouse the reader's curiosity.
- 33–5 make the reader realize his ignorance. . . . . 33( )

34. The best heading for this passage would be
- 34–1 Three Unusual Birds.
- 34–2 Migratory Birds.
- 34–3 Bird Life.
- 34–4 The Golden Plover.
- 34–5 Plovers. . . . . 34( )

- - - - - - - - - - - - -

Amy bid furiously at the auction for a lot described as "Twelve kitchen chairs; also a small wicker knife-basket." Robert, knowing the size of their kitchen, made urgent signals to her across the room. She stopped bidding, and the lot was knocked down to someone else for more than its value by a grateful but mystified auctioneer.

"You got mixed up in the lot numbers, didn't you?" Robert said afterwards.

"No, dear," she said guiltily. "I'm awfully sorry. It was that knife-basket. I suddenly thought—so wretched not to be grand enough to be in a lot by itself. Just tagged onto kitchen chairs like that."

35. Robert is probably
- 35–1 Amy's husband.
- 35–2 one of Amy's servants.
- 35–3 a friend of Amy's.
- 35–4 a stranger to Amy.
- 35–5 Amy's father. . . . . 35( )

36. Robert signaled Amy to
- 36–1 stop bidding.
- 36–2 bid higher.
- 36–3 let him bid.
- 36–4 watch the auctioneer.
- 36–5 tell her that he was leaving. . . . . 36( )

37. Amy was bidding because she
- 37–1 needed some kitchen chairs.
- 37–2 thought that it was fun to bid.
- 37–3 knew that it would bother Robert.
- 37–4 needed a knife-basket.
- 37–5 felt sorry for the knife-basket. . . . 37( )

38. Robert thought that Amy had
- 38–1 bid for the kitchen chairs by mistake.
- 38–2 forgotten when to stop bidding.
- 38–3 not bid high enough for the chairs.
- 38–4 for once shown good sense in bidding high.
- 38–5 no idea why people were bidding. . . 38( )

39. The auctioneer could not understand why
- 39–1 Amy stopped bidding.
- 39–2 so high a price was bid for the lot mentioned.
- 39–3 anyone should get mixed up in the lot numbers.
- 39–4 the knife-basket was included in the same lot with the chairs.
- 39–5 anyone would want twelve kitchen chairs. . . . . 39( )

- - - - - - - - - - - - -

Go on to the next page.

Here is the way to make a grenade that anyone accustomed to dealing with explosives can follow and that any brave man with a little training can use. Take an eight-ounce stick of ordinary blasting dynamite that is about 1½ inches in diameter and divide it carefully into three equal parts. Then take two sections of pipe about 2 inches in diameter. Pipe made of malleable iron or steel is best. These are in every plumber's stock. These sections of pipe should be welded roughly or stuck together with any glue that grips metals. Next, wrap one part of the explosive in stiff paper and slip it inside the pipe. Some of the explosive will probably stick out at the ends. Now make a hole in one end of the explosive with a pencil. Get ready, *but do not insert*, a detonator to fit this hole. Modern detonators are safer than those of the past, but they should not be handled or put near the explosive until this becomes necessary.

Attach firmly to the detonator a length of black fuse the sort that burns about 2 feet per minute. Three inches is enough; that gives you 7½ seconds. You can, shorten this fuse as desired to give a 5-second or 2½-second interval between lighting and bursting. Last, wrap the whole thing in a piece of waterproof cloth and tie it at the neck near the fuse.

40. The best heading for this passage would be
- 40–1 Hand Grenades.
- 40–2 Military Information.
- 40–3 Homemade Explosives.
- 40–4 The Use of Grenades.
- 40–5 How to Make a Grenade. . . . . 40( )

41. The diameter of the completed grenade will be about
- 41–1 1½ inches.
- 41–2 2 inches.
- 41–3 3½ inches.
- 41–4 4 inches.
- 41–5 5 inches. . . . . 41( )

42. The grenade is wrapped in cloth primarily to
- 42–1 keep it from getting wet inside.
- 42–2 keep out dust.
- 42–3 prevent it from exploding too soon.
- 42–4 prevent fragments from flying about when it explodes.
- 42–5 make it easier to carry. . . . . 42( )

43. To secure a 10-second interval between lighting and bursting, the length of the fuse must be
- 43–1 10 inches.
- 43–2 2 inches.
- 43–3 3 inches.
- 43–4 4 inches.
- 43–5 8 inches. . . . . 43( )

44. Before placing the explosive in the sections of pipe, it should be
- 44–1 cut to the right length.
- 44–2 fitted with a detonator.
- 44–3 wrapped in paper.
- 44–4 provided with a hole for the detonator.
- 44–5 attached to a length of black fuse. 44( )

45. Each grenade will contain
- 45–1 1½ ozs. of dynamite.
- 45–2 2 ozs. of dynamite.
- 45–3 3 ozs. of dynamite.
- 45–4 2⅔ ozs. of dynamite.
- 45–5 8 ozs. of dynamite. . . . . 45( )

46. The writer puts special emphasis on the importance of
- 46–1 using blasting dynamite.
- 46–2 using pipe made of malleable iron or steel.
- 46–3 not inserting the detonator in the explosive until necessary.
- 46–4 wrapping the grenade in waterproof cloth.
- 46–5 selecting a fuse 3 inches in length. . 46( )

- - - - - - - - - - - - -

(1) One day when I was out hunting I used up all
(2) my shot on small game. Shortly after, I came
(3) upon a fine stag. I charged my gun with powder
(4) and a handful of cherrystones. Thus I let fly at
(5) the stag and hit him on the middle of his forehead
(6) between the antlers. It stunned him; he staggered,
(7) yet he made off. A year or two after, I beheld in
(8) the same forest a noble stag with a fine full-grown
(9) cherry tree more than ten feet high between his
(10) antlers. Recalling my former adventure, I looked
(11) upon him as my own and brought him to the
(12) ground by one shot, which at once gave me the
(13) haunch and cherry sauce; for the tree was covered
(14) with the richest fruit, the like I had never tasted
(15) before.

47. The writer says that, when he first saw the stag, he
- 47–1 fired on it but missed.
- 47–2 wounded it seriously.
- 47–3 hit it with a cherrystone.
- 47–4 did not want to kill it.
- 47–5 thought it was too small to bother with. . . . . 47( )

48. The most believable statement of the writer is that
- 48–1 he saw a stag in the forest.
- 48–2 he stunned the stag when he first saw it.
- 48–3 he saw a stag with a cherry tree between its antlers.
- 48–4 he obtained both haunch and cherry sauce.
- 48–5 the cherry sauce was the best he had ever tasted. . . . . 48( )

49. "At once" in line 12 means
- 49–1 immediately.
- 49–2 for the last time.
- 49–3 very soon.
- 49–4 for the first time.
- 49–5 in a single stroke. . . . . 49( )

Go on to the next page.

50. It is most probable that this anecdote is
- 50–1 a true account of a remarkable occurrence.
- 50–2 slightly exaggerated.
- 50–3 not intended to be believed.
- 50–4 intended to show how stags may best be hunted.
- 50–5 intended as proof of the writer's marksmanship. . . . . 50( )

- - - - - - - - - - - - -

(1) Their leader stood, as all other Western men did,
(2) for the principle that every community must have
(3) its own life in the free partnership it had formed,
(4) and its own unhindered, unbidden development,
(5) unchecked by the national government; for he
(6) believed that to be the end and object of the Union,
(7) to make the states secure of their individual de-
(8) velopment and set them forward in their own ways.
(9) But there was an infection of national feeling, too,
(10) upon the stirring frontier where he had been bred
(11) which no man could escape; a sense as of a people's
(12) life a-making upon a continental scale; an ardor
(13) for broad schemes and vast achievement, in hands
(14) united and backed by the nation's power.

51. The leader was brought up
- 51–1 on the frontier.
- 51–2 in a large Western city.
- 51–3 in the South.
- 51–4 outside the Union.
- 51–5 on the sea. . . . . 51( )

52. The leader's ideas seem to be
- 52–1 unrelated to one another.
- 52–2 pessimistic.
- 52–3 unique.
- 52–4 conflicting.
- 52–5 lawless. . . . . 52( )

53. "An infection" in line 9 most nearly means
- 53–1 an injury.
- 53–2 a disease.
- 53–3 an atmosphere.
- 53–4 a decline.
- 53–5 a discovery. . . . . 53( )

54. The leader is most strongly in favor of
- 54–1 a powerful national government.
- 54–2 independent state governments.
- 54–3 dissolving the Union.
- 54–4 giving up frontier life.
- 54–5 cleansing our national life. . . . . 54( )

55. "Stirring" in line 10 most nearly means
- 55–1 confusing.
- 55–2 moving.
- 55–3 disturbing.
- 55–4 exciting.
- 55–5 dangerous. . . . . 55( )

56. The leader believed that the main purpose of the Union was to
- 56–1 develop the nation on a continental scale.
- 56–2 prevent the states from interfering with one another.
- 56–3 stir up national feeling.
- 56–4 provide protection for the settlements on the frontier.
- 56–5 make it possible for each state to develop in its chosen way. . . . . 56( )

57. "Which" in line 11 refers to
- 57–1 "the national government" (line 5).
- 57–2 "the end and object of the Union" (line 6).
- 57–3 "their individual development" (lines 7–8).
- 57–4 "an infection of national feeling" (line 9).
- 57–5 "the stirring frontier" (line 10). . . 57( )

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"And what, by Jove," said the Colonel, turning to Mrs. Stickney, "is *your* opinion of all these blood sports?"

"I think they are indefensible but irresistible," she answered. She had found through long experience that this remark usually closed the subject pretty quickly. It left very little to be said. Besides, she meant it.

"Ha!" exclaimed the Colonel. She noted with delight that he really did say "Ha!" This made a valuable addition to her collection. She had lately acquired a "Humph!" and two "Whews!" but she was still waiting for a "Pshaw!"

58. Mrs. Stickney did not want to
- 58–1 hurt the Colonel's feelings.
- 58–2 be left out of the discussion.
- 58–3 say what she really thought about blood sports.
- 58–4 talk to the Colonel at all.
- 58–5 take part in the discussion of blood sports. . . . . 58( )

59. Mrs. Stickney had not heard anyone around her say,
- 59–1 "Humph!"
- 59–2 "Whew!"
- 59–3 "Ha!"
- 59–4 "Pshaw!"
- 59–5 "By Jove!" . . . . . 59( )

60. It is evident that Mrs. Stickney thinks that
- 60–1 the discussion of blood sports is fruitless.
- 60–2 the Colonel does not expect her to answer his question.
- 60–3 the Colonel was surprised by her answer to his question.
- 60–4 the people with whom she is talking are very intellectual.
- 60–5 blood sports are very disgusting. . 60( )

* * * * * * * *

Go on to the next page.

"Any cards going tonight?" inquired the Southerner.

"Stud and draw," Slim told him. "Strangers playing."

"I think I'd like to get into a game for a while," said the Southerner.

And then, before quitting the store, he made his toilet for this little hand at poker. It was a simple preparation. He took his pistol from its holster, examined it, then shoved it between his overalls and his shirt in front, and pulled his waistcoat over it. He might have been combing his hair for all the attention anyone paid to this, except myself. Then the two friends went out and I thought of the name that Slim had applied to the Southerner as he clapped him on the shoulder. Clearly this wild country spoke a language other than mine.

61. Apparently the Southerner's preparations for the card game were
- 61–1 unusual.
- 61–2 considered dangerous by the bystanders.
- 61–3 customary.
- 61–4 amusing to the bystanders.
- 61–5 carefully concealed. . . . . 61( )

62. The writer is evidently
- 62–1 a stranger.
- 62–2 an old friend of the Southerner.
- 62–3 one of the poker players.
- 62–4 an old friend of Slim.
- 62–5 the storekeeper. . . . . 62( )

63. The writer was apparently surprised at the
- 63–1 Southerner's desire to play cards.
- 63–2 way in which the Southerner prepared for the card game.
- 63–3 fact that the Southerner made so few preparations for the card game.
- 63–4 Southerner's friendship with Slim.
- 63–5 Southerner's choice of words. . . . 63( )

- - - - - - - - - - - - -

Bullfighting was introduced into Spain by the Moors in the thirteenth century. Today every move in the drama of the fight is made according to time-honored custom. Each bull is allowed to attack three horses and each horse may be attacked three times. After each of the three horses has been attacked, the first banderillo challenges the bull. He holds in each hand a barbed stick, gay with colored paper; as the bull charges him, he plunges the barbs into its shoulders. Four pairs of barbs are thus fastened in the bull's shoulders. Then the

(*Continued in next column*)

(*Continued from preceding column*)

matador takes charge. He makes seven passes before the bull with a red cape. Finally, the bull stops, weary and puzzled, snorting with rage. The matador now attempts to choose a moment for the death thrust when the bull's fore feet are close together. Only then can the sword be plunged to the animal's heart.

64. In a bullfight, the bull first attacks
- 64–1 the matador.
- 64–2 the banderillo.
- 64–3 a horse.
- 64–4 a red cape.
- 64–5 another bull. . . . . 64( )

65. Apparently the matador tries to kill the bull by
- 65–1 fastening barbs in its shoulders.
- 65–2 tiring it to death.
- 65–3 bleeding it to death.
- 65–4 thrusting a sword into its heart.
- 65–5 plunging a sword into its brain. . . 65( )

66. How many barbs are fastened in the bull's shoulders?
- 66–1 7
- 66–2 2
- 66–3 3
- 66–4 4
- 66–5 8 . . . . . 66( )

67. The main purpose of the writer is apparently to
- 67–1 describe the main events in a bullfight.
- 67–2 show that bullfighting is a cruel sport.
- 67–3 make the reader want to attend a bullfight.
- 67–4 tell about the origins of bullfighting.
- 67–5 emphasize the amount of skill required for bullfighting. . . . . 67( )

68. How many times does the matador wave his red cape before the bull?
- 68–1 Six times
- 68–2 Twice
- 68–3 Three times
- 68–4 Nine times
- 68–5 Seven times . . . . . 68( )

69. According to the passage, bullfighting
- 69–1 originated in Spain.
- 69–2 was invented by the Moors.
- 69–3 usually results in the death of a bull.
- 69–4 first appeared in Spain after the year 1200.
- 69–5 is a dangerous sport. . . . . 69( )

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I do not mean by beauty of form such beauty as that of animals or pictures, which the many would suppose to be my meaning; but understand me to mean straight lines and circles, and the plain or solid figures that are formed out of them by turning-lathes and rulers and measurers of angles; for these I affirm to be not only relatively beautiful, like other things, but they are eternally and absolutely beautiful.

70. The writer thinks that his idea of beauty is
- 70–1 easy to understand.
- 70–2 the only one that is correct.
- 70–3 not held by many people.
- 70–4 only relative.
- 70–5 simpler than others. . . . . 70( )

71. The writer sees beauty mainly in
- 71–1 nature.
- 71–2 painting.
- 71–3 sculpture.
- 71–4 poetry.
- 71–5 geometric figures. . . . . 71( )

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(1) As botanists we are interested in the moment
(2) when the first plant began. For there was raised
(3) the flag of life. Any organism that could exist
(4) upon a naked planet would have to be completely
(5) self-supporting. It would have to be such a being
(6) as could absorb raw, elemental materials and, using
(7) inorganic sources of energy, make living proto-
(8) plasm of them. Such describes no animal. But
(9) it perfectly describes an autotrophic plant An
(10) autotroph is a self-sustaining vital mechanism.

72. The writer implies that the earth in very early times was
- 72–1 more favorable to life than it is at present.
- 72–2 less favorable to life than it is at present.
- 72–3 inhabited by animals rather than plants.
- 72–4 inhabited by both animals and plants.
- 72–5 lacking in both energy and raw materials. . . . . 72( )

73. In speaking of "a naked planet," the writer means that the earth had no
- 73–1 human inhabitants.
- 73–2 atmosphere.
- 73–3 vegetation.
- 73–4 sources of energy.
- 73–5 elemental materials. . . . . 73( )

74. The writer believes that the first life that appeared upon the earth was in the form of
- 74–1 one-celled animals.
- 74–2 reptiles.
- 74–3 insects.
- 74–4 plants.
- 74–5 mammals. . . . . 74( )

75. From the context, we may most reasonably infer that "autotrophic" in line 9 means
- 75–1 elemental.
- 75–2 inorganic.
- 75–3 independent.
- 75–4 living.
- 75–5 parasitic. . . . . 75( )

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A very arrogant baron who has already won three ransoms determines to increase his wealth further. Stationing himself at the head of the lists, he bids his pursuivant challenge all comers. There is a long hush. Sire Paul is assuredly a terrible man. Suddenly the spectators begin to cry, "A St. Aliquis." Sire Aimery himself is sending down an acceptance of the challenge. All the older knights mutter, "A fearful risk for the lad. Let him pray to his saints." Conon demands angrily of Olivier, "Could you not keep the boy back from this folly?"

But does not Heaven favor the young and the brave? Perhaps it is because Sire Paul has let himself become careless; perhaps it is because his squire has forgotten to tighten his saddle girths. In any case, results confound the prophets. And no victory could have been more popular.

76. Sire Paul is evidently
- 76–1 an experienced warrior.
- 76–2 a very young man.
- 76–3 a popular knight.
- 76–4 a penniless knight.
- 76–5 an unskilled warrior. . . . . 76( )

77. The older knights expected that
- 77–1 Sire Paul would be killed.
- 77–2 Sire Aimery would be killed.
- 77–3 St. Aliquis would be disgraced.
- 77–4 Sire Aimery's pursuivant would be injured.
- 77–5 both Sire Paul and Sire Aimery would be killed. . . . . 77( )

78. Sire Paul engaged in combat principally to
- 78–1 improve his reputation as a warrior.
- 78–2 prove that he was afraid of no one.
- 78–3 make money.
- 78–4 provide entertainment for the spectators.
- 78–5 satisfy his own vanity. . . . . 78( )

79. We may be most certain that Sire Aimery is
- 79–1 a young man.
- 79–2 unpopular with the spectators.
- 79–3 Conon's pursuivant.
- 79–4 a wealthy man.
- 79–5 reluctant to challenge Sire Paul. . . 79( )

80. To the spectators, the result of the combat was
- 80–1 what they had expected.
- 80–2 disappointing.
- 80–3 pleasing.
- 80–4 of no interest.
- 80–5 inconclusive. . . . . 80( )

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Somehow it wasn't quite right that French trees and grass should be of the same green, French earth of the same brown, French sky of the same blue, as in a natural, correct country like the United States. After the tight little fenced fields of England, the wide Picardy plains, green with approaching April, seemed to Mr. Atwood extraordinarily like the prairies of Illinois and Iowa. It was a little disappointing, not quite right and decent after he had gone and taken so long and expensive a journey, yet he was pleased by a sense of recognition.

81. Mr. Atwood has apparently
- 81–1 studied a great deal of geography.
- 81–2 found France to be just as he expected it.
- 81–3 long dreaded a trip to France.
- 81–4 been disappointed by the scenery in England.
- 81–5 not traveled very much before. . . 81( )

82. Mr. Atwood has just left
- 82–1 his own country.
- 82–2 America.
- 82–3 Picardy.
- 82–4 England.
- 82–5 southern Europe. . . . . 82( )

83. It was a little disappointing to Mr. Atwood to find that the scenery in France
- 83–1 looked like American scenery.
- 83–2 was different from English scenery.
- 83–3 was not worth looking at.
- 83–4 lacked contrasting colors.
- 83–5 looked unnatural and foreign. . . . 83( )

84. Mr. Atwood was apparently traveling in
- 84–1 March.
- 84–2 April.
- 84–3 May.
- 84–4 June.
- 84–5 July. . . . . 84( )

85. The writer is probably trying to convey the idea that
- 85–1 all countries are a little disappointing at first.
- 85–2 most countries look fundamentally very much alike.
- 85–3 travel is disappointing.
- 85–4 France is beautiful in the spring.
- 85–5 America is more beautiful than France. . . . . 85( )

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(1) Poverty may be an unescapable misfortune, but
(2) that no more makes it honorable than a cocked eye
(3) is made honorable by the same cause. Do I advo-
(4) cate, then, the ceaseless, senseless hogging of
(5) money? I do not. All I advocate—and praise as
(6) virtuous—is the hogging of enough to provide
(7) security and ease. Despite all the romantic super-
(8) stitions to the contrary, the artist cannot do his
(9) best work when he is oppressed by unsatisfied
(10) wants. The best and clearest thinking of the
(11) world is done and the finest art is produced, not by
(12) men who are hungry, ragged, and harassed, but by
(13) men who are well fed, warm, and easy in mind.

86. The writer thinks that poverty is
- 86–1 dishonorable.
- 86–2 honorable.
- 86–3 useful.
- 86–4 unfortunate.
- 86–5 romantic. . . . . 86( )

87. "The same cause" in line 3 refers to
- 87–1 "a cocked eye" (line 2).
- 87–2 being unavoidable.
- 87–3 the fact that poverty is a misfortune.
- 87–4 the fact that a cocked eye is sometimes amusing.
- 87–5 personal honor. . . . . 87( )

88. "Easy," as used in line 13, means .
- 88–1 simple.
- 88–2 soft.
- 88–3 generous.
- 88–4 content.
- 88–5 capable. . . . . 88( )

Go on to the next page.

89. The writer implies that most people believe that

89–1 all artists are poor.
89–2 artists do their best work when they are poor.
89–3 artists are superstitious.
89–4 artists and scientists should be well paid.
89–5 poverty is unavoidable. . . . . 89( )

90. Which one of the following words in the passage seems somewhat inappropriate in its context?

90–1 Honorable (line 2)
90–2 Honorable (line 3)
90–3 Hogging (line 4)
90–4 Hogging (line 6)
90–5 Wants (line 10) . . . . . 90( )

* * * * * * * *

Number wrong	0–2	3–6	7–10	11–14	15–18	19–22	23–26	27–30	31–34	35–38	39–42	43–46	47–50	51–54	55–58	59–62	63–66	67–70	71+
Amount to be subtracted	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Speed of Comprehension Score

Total number right_____

Subtract
(See table above)_____

Raw Score = Difference_____

Scaled Score_____
(See table on key)

Level of Comprehension Score

Number of *completed* scales_____
(1 if last item marked is 30, 31, ··· 59;
2 if last item marked is 60, 61, ··· 89;
3 if last item marked is 90)

Number right_____
(on *completed* scales only)

Subtract_____
(Look up in table at left amount to be subtracted corresponding to the number wrong on *completed* scales)

Raw Score = Difference_____

Scaled Score_____
(See table on key under column corresponding to number of scales *completed*)

OTIS QUICK-SCORING MENTAL ABILITY TESTS

Beta

B

By Arthur S. Otis, Ph.D.

Formerly Development Specialist with Advisory Board, General Staff, United States War Department

BETA TEST: FORM B

IQ..... For Grades 4–9 Score.....

Read this page. Do what it tells you to do.

Do not open this booklet, or turn it over, until you are told to do so.
Fill these blanks, giving your name, age, birthday, etc. Write plainly.

Name.....Age last birthday .....years
First name, initial, and last name

Birthday.....Teacher.....Date.....19.....
Month Day

Grade.....School.....City.....

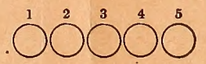
This is a test to see how well you can think. It contains questions of different kinds. Here is a sample question already answered correctly. Notice how the question is answered:

Sample: Which one of the five things below is soft?
1 glass 2 stone 3 cotton 4 iron 5 ice.....

The right answer, of course, is *cotton;* so the word *cotton* is underlined. And the word *cotton* is No. 3; so a heavy cross has been put in the 3d circle. This is the way you are to answer the questions.

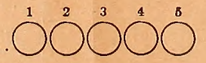
Try this sample question yourself. Do not write the answer; just draw a line under it and then put a heavy cross in the right circle.

Sample: A robin is a kind of —
1 plant 2 bird 3 worm 4 fish 5 flower .....



The answer is *bird;* so you should have drawn a line under the word *bird* and put a heavy cross in the 2d circle. Try this one:

Sample: Which one of the five numbers below is larger than 55?
1 53 2 48 3 29 4 57 5 16 .....



The answer, of course, is 57; so you should have drawn a line under 57 and put a heavy cross in the 4th circle.

The test contains 80 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed half an hour after the examiner tells you to begin. Try to get as many right as possible. Be careful not to go so fast that you make mistakes. Do not spend too much time on any one question. No questions about the test will be answered by the examiner after the test begins. Lay your pencil down.

Do not turn this booklet until you are told to begin.

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Examination begins here.

Page 1

1. Which one of the five things below does not belong with the others?
1 peach 2 banana 3 orange 4 baseball 5 plum.....

2. Which one of the five answers below tells best what a saw is?
1 something 2 a tool 3 furniture 4 wood 5 a machine.....

3. Which one of the five words below means the opposite of south?
1 west 2 arctic 3 north 4 tropics 5 pole.....

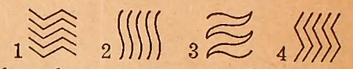
4. A boy is to a man and a lamb is to a sheep as a kitten is to a —
1 girl 2 cat 3 dog 4 wolf 5 pole.....

5. If we feel sorry for the suffering of another, we have a feeling of —
1 hate 2 pity 3 contempt 4 disdain 5 eagerness.....

6. Which one of the five things below is the smallest?
1 a twig 2 a limb 3 a bud 4 a tree 5 a branch.....

7. Which word means the opposite of succeed?
1 win 2 decline 3 try 4 accede 5 fail.....

8. Three of the four designs at the right are alike. Which one is not like the other three?



9. Which one of the five things below is most like these three: a carrot, an onion, and a cabbage? 1 a bush 2 an apple 3 a potato 4 a salad 5 a cherry.....

10. A finger is to a hand as a toe is to a what?
1 foot 2 toenail 3 heel 4 shoe 5 knee.....

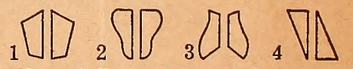
11. Which expression tells best just what a floor is? 1 part of a house 2 an inverted wall 3 the part of a room to walk on 4 it is made of wood 5 a place to put a chair

12. If we believe someone has committed a crime, but we are not sure, we have a —
1 fear 2 suspicion 3 wonder 4 confidence 5 misunderstanding.....

13. Hat is to head as thimble is to what?
1 finger 2 needle 3 thread 4 hand 5 sewing.....

14. At 4 cents each, how many pencils can be bought for 32 cents?
1 36 2 8 3 128 4 4 5 28.....

15. Three of the four designs at the right are alike. Which one is not like the other three?



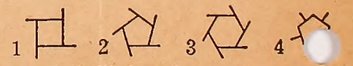
16. Why have the means for air transportation increased? 1 Trains were unsafe. 2 Roads were crowded. 3 There was a demand for more rapid transportation. 4 Airplanes furnish work for mechanics. 5 Trains were getting too crowded.....

17. Which one of the five things below is most like these three: a pick, a shovel, and a rake?
1 a ladder 2 a club 3 a garden 4 a hoe 5 a plow.....

18. Wool is to a sheep as feathers are to what?
1 a pillow 2 a rabbit 3 a bird 4 a goat 5 a bed.....

19. If the words below were rearranged to make the best sentence, with what letter would the last word of the sentence begin? usually cans made tin of are
1 m 2 t 3 c 4 u 5 o.....

20. Three of the four designs at the right are alike. Which one is not like the other three?



21. If a person sleeping quietly is awakened by a sudden cry, he is likely to be —
1 sick 2 dreaming 3 startled 4 paralyzed 5 asleep.....

22. Which of the five things below is most like these three: a goat, a frog, and a dove?
1 a flower 2 a nest 3 a yard 4 a snake 5 a tree.....

23. One number is wrong in the following series. 1 6 2 6 3 6 4 6 5 6 7 6
What should that number be? 1 8 2 6 3 7 4 9 5 5.....

(*Go right on to Page 2*).

Page 2

24. Which of the five words below means the opposite of difficult?
1 hard 2 quick 3 soft 4 easy 5 common...

25. Food is to the body as what is to an engine?
1 wheels 2 motion 3 smoke 4 fuel 5 fire..

26. Which of these five words would come first in the dictionary?
1 many 2 obey 3 house 4 porch 5 elephant

27. Which tells best what a cup is? 1 It has a handle. 2 something to hold coffee 3 a thin, breakable object 4 It is used on a table. 5 a small drinking vessel.....

28. Which tells best just what a cat is? 1 it drinks milk 2 something that walks quietly 3 it has soft fur 4 a small domestic animal 5 a thing that climbs trees

29. Which of these series contains a wrong number?
1 3–6–9–12–15 2 1–4–7–10–13
3 2–5–8–11–14 4 1–3–5–7–9 5 2–4–6–8–11.....

30. Which one of the five things below is most like these three: a doll, a top, and a scooter?
1 a box 2 a broom 3 a pillow 4 a yard 5 a kite.....

31. If the words below were rearranged to make a good sentence, the last word of the sentence would begin with what letter?
leather shoes usually made are of
1 u 2 s 3 l 4 m 5 a.....

32. A church is to a preacher as a school is to what?
1 study 2 pupils 3 a teacher 4 religion 5 a choir

33. If John is older than Peter and Peter is older than Harry, then John is (?) Harry. 1 older than 2 younger than 3 just as old as 4 (cannot say which).....

34. Bread is to man as hay is to what?
1 wheat 2 a horse 3 grass 4 a barn 5 flour

35. Count each 5 below that has a 7 next after it.
7 5 3 5 7 2 3 7 5 6 7 7 2 5 7 3 4 7 7 5 2 0 7 5 7 8 3 7 2 5 1 7 9 6 5 7
Tell how many 5's you counted.
1 13 2 8 3 3 4 4 5 5.....

36. The son of my father's sister is my —
1 brother 2 nephew 3 cousin 4 uncle 5 grandson..

37. Worse is to bad as better is to what?
1 very bad 2 medium 3 good 4 much better 5 worse

38. A coin made by an individual and meant to look like one made by the government is called a —
1 duplicate 2 counterfeit 3 imitation 4 forgery 5 libel

39. If the following words were arranged in order, the middle word would begin with what letter?
Eleven One Nine Zero Ten Seven Five
1 Z 2 N 3 S 4 T 5 F.....

40. If George is taller than Frank and George is shorter than James, then James is (?) Frank. 1 taller than 2 shorter than 3 just as tall as 4 (cannot say which)

41. Which one of the five things below is most like these three: a president, an admiral, and a general?
1 a ship 2 an army 3 a king 4 a republic 5 a soldier

(*Go right on to No. 42 on Page 3.*)

Page 3

42. Which statement tells best just what a fork is?
1 a thing to use when eating 2 it goes with a knife
3 an instrument with prongs for lifting
4 it goes on the table 5 it is made of silver 42

43. What is the most important reason that bright lights are placed in front of theaters? 1 to help light up the street 2 so that people can see where they are 3 to attract attention and look inviting 4 so that people can see the advertisements better 5 electricity is furnished to theaters cheaply 43

44. There is a saying, "A stitch in time saves nine." It means that — 1 A little sewing may save nine dollars.
2 It pays to attend to troubles before they get worse.
3 You should work hard and save as much as you can.
4 You can save time by sewing. 5 Sewing takes time... 44

45. If the following words were arranged in order, which word would be in the middle?
1 sentence 2 letter 3 paragraph 4 word 5 chapter 45

46. A book is to information as (?) is to money.
1 paper 2 dollars 3 a bank 4 work 5 gold.. 46

47. Which of these words would come first in the dictionary?
1 brave 2 burst 3 broke 4 build 5 breadth. 47

48. If Frank is younger than George and George is just as old as James, then James is (?) Frank. 1 younger than
2 older than 3 just as old as 4 (cannot say which) 48

49. Son is to daughter as uncle is to —
1 aunt 2 mother 3 relation 4 woman 5 sister 49

50. A man who strives and hopes to achieve success is said to be —
1 ambitious 2 lazy 3 contented 4 faithful 5 loyal 50

51. Which tells best just what a guess is? 1 a mistaken idea
2 a statement we think most likely correct 3 a statement that is almost correct 4 something we cannot find out... 51

52. Large is to object as loud is to what?
1 soft 2 small 3 heavy 4 sound 5 weight.. 52

53. If the words below were rearranged to make a good sentence, the third word of the sentence would begin with what letter?
boys birch the a canoe made bark
1 a 2 t 3 b 4 c 5 m 53

54. Which word means the opposite of truth?
1 cheat 2 rob 3 liar 4 ignorance 5 falsehood..... 54

55. If a man has walked west from his home 8 blocks and then walked east 5 blocks, how many blocks is he from home?
1 13 2 8 3 3 4 4 5 5 55

56. If the suffering of another makes us suffer also, we feel —
1 worse 2 harmony 3 sympathy 4 love 5 repelled 56

57. A governor is to a state as a general is to what?
1 a king 2 war 3 an army 4 a captain 5 a commander 57

58. A sting is to a bee as a revolver is to a —
1 hive 2 fly 3 weapon 4 horn 5 man..... 58

(Go right on to Page 4 under Page 2.)

Answers for Page 3

Answers for Page 1

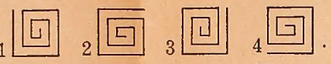
Page 4

59. There is a saying, "He that scatters thorns, let him go barefoot." What does this mean?
1 Let him who causes others discomforts bear them himself also. 2 Going barefoot toughens the feet.
3 People should pick up what they scatter. 4 Don't scatter things around. 5 Thorns hurt feet. 59

60. Three of the four designs at the right are alike. Which one is not like the other three? 60

61. Which one of the five words below is most like these three: [illegible], [illegible]ack, and hard?
1 thick 2 coal 3 very 4 soot 5 color 61

62. There is a saying, "Make hay while the sun shines." This means —
1 Hay made in cloudy weather is poor. 2 Haste makes waste. 3 Make the best of your opportunities.
4 Hay grows best in summer. 5 It is more healthful to work in the sun than in the shade..... 62

63. Three of the four designs at the right are alike. Which one is not like the other three?  63

64. If the following words were arranged in order, which word would be in the middle?
1 state 2 park 3 nation 4 city 5 yard 64

65. Which tells best just what a neck is? 1 It is something to wear a collar on. 2 It is that which joins the head to the body. 3 It is something to fasten a necklace on. 4 It is the connecting part of the body. .. 65

66. A statement which expresses just the opposite of that which another statement expresses is said to be a —
1 lie 2 contradiction 3 falsehood 4 correction 5 explanation 66

67. Which one of the words below would come *last* in the dictionary?
1 glory 2 label 3 green 4 linen 5 knife 67

68. Three of the four designs at the right are alike. Which one is not like the other three? 68

69. What letter follows the letter that comes next after K in the alphabet?
1 I 2 J 3 M 4 K 5 L 69

70. One number is wrong in the following series. 1 2 4 8 16 24 64
What should that number be? 1 12 2 6 3 3 4 48 5 32 70

71. If I have a large box with 5 small boxes in it and 2 very small boxes in each of the small boxes, how many boxes are there in all? 1 7 2 8 3 10 4 16 5 15 71

72. There is a saying, "Kill not the goose that lays the golden eggs." This means that —
1 Geese that lay golden eggs are too tough to eat. 2 Don't destroy the things that do you good.
3 Don't kill birds. 4 Not many geese can lay golden eggs. 5 Golden eggs are valuable. 72

73. If a photograph that is 3 inches long and 2 inches wide is enlarged to be 15 inches long, how many inches wide will it be? 1 14 2 13 3 10 4 $7\frac{1}{2}$ 5 5 73

74. One number is wrong in the following series. 1 2 5 6 9 10 13 14 16 18
What should that number be? 1 4 2 7 3 3 4 15 5 17 74

75. When the time by a clock was 9 minutes past 8, the hands were interchanged. The clock then said about —
1 8 min. past 9 2 9 min. past 8 3 19 min. past 1 4 9 min. of 8 5 19 min. of 2 75

76. A car owner uses a mixture in his radiator containing 1 quart of alcohol to every 2 quarts of water. How many quarts of alcohol are needed for 12 quarts of the mixture? 1 6 2 24 3 11 4 4 5 $\frac{1}{2}$ 76

77. What letter in the following series appears a third time nearest the beginning?
A E B C A D D E B F C B D A E E C D 1 A 2 B 3 C 4 D 5 E 77

78. In a foreign language *tana dona meka* means *very cold water; tana neta* means *hot water; dona bela* means *very good.* What word means cold? 1 tana 2 dona 3 meka 4 neta 5 bela 78

79. Which one of the five words below does not belong with the others?
1 time 2 temperature 3 length 4 weight 5 number 79

80. A boy is now three times as old as his sister. In 3 years he will be only twice as old. How many years old is he now? 1 15 2 6 3 3 4 12 5 9 80

Answers for Page 4

Answers for Page 2

APPENDIX C

CORRELATION CHARTS

Correlation Chart for Computation of Pearson Product-Moment Coefficient of Correlation

X = Total Auditory
Y = Word Pronunciation

X SCALE REPRESENTS _____

Y SCALE REPRESENTS _____

			114-122	123-131	132-140	141-149	150-158	159-167	168-176	177-185	186-194	195-203	204-212	213-221	222-230	231-239	240-248	249-257	258-266	267-275	276-284	f	d	y'	y'²	x'y' +	x'y' −
	-100	-90	-80	-70	-60	-50	-40	-30	-20	-10		10	20	30	40	50	60	70	80	90	100		10				
59-61	-90	-81	-72	-63	-54	-45	-36	-27	-18	-9		9	18	27	36	45	54	63	72	81	90	6	9	54	486	423	
56-58	-80	-72	-64	-56	-48	-40	-32	-24	-16	-8		8	16	24	32	40	48	56	64	72	80	20	8	160	1280	1160	
53-55	-70	-63	-56	-49	-42	-35	-28	-21	-14	-7		7	14	21	28	35	42	49	56	63	70	16	7	112	784	742	
50-52	-60	-54	-48	-42	-36	-30	-24	-18	-12	-6		6	12	18	24	30	36	42	48	54	60	17	6	102	612	558	
47-49	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5		5	10	15	20	25	30	35	40	45	50	8	5	40	200	150	
44-46	-40	-36	-32	-28	-24	-20	-16	-12	-8	-4		4	8	12	16	20	24	28	32	36	40	17	4	68	272	172	
41-43	-30	-27	-24	-21	-18	-15	-12	-9	-6	-3		3	6	9	12	15	18	21	24	27	30	1	3	3	9	0	
38-40	-20	-18	-16	-14	-12	-10	-8	-6	-4	-2		2	4	6	8	10	12	14	16	18	20	4	2	8	16	2	
35-37	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7	8	9	10	6	1	6	6		2
32-34																						4					
29-31	10	9	8	7	6	5	4	3	2	1		-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	5	-1	-5	5	5	
26-28	20	18	16	14	12	10	8	6	4	2		-2	-4	-6	-8	-10	-12	-14	-16	-18	-20	2	-2	-4	8	12	
23-25	30	27	24	21	18	15	12	9	6	3		-3	-6	-9	-12	-15	-18	-21	-24	-27	-30	4	-3	-12	36	3	
20-22	40	36	32	28	24	20	16	12	8	4		-4	-8	-12	-16	-20	-24	-28	-32	-36	-40	3	-4	-12	48	48	
17-19	50	45	40	35	30	25	20	15	10	5		-5	-10	-15	-20	-25	-30	-35	-40	-45	-50	4	-5	-20	100	80	
14-16	60	54	48	42	36	30	24	18	12	6		-6	-12	-18	-24	-30	-36	-42	-48	-54	-60	0	-6	0	0	0	
11-13	70	63	56	49	42	35	28	21	14	7		-7	-14	-21	-28	-35	-42	-49	-56	-63	-70	3	-7	-21	147	140	
8-10	80	72	64	56	48	40	32	24	16	8		-8	-16	-24	-32	-40	-48	-56	-64	-72	-80	0	-8	0	0	0	
5-7	90	81	72	63	54	45	36	27	18	9		-9	-18	-27	-36	-45	-54	-63	-72	-81	-90	0	-9	0	0	0	
2-4	100	90	80	70	60	50	40	30	20	10		-10	-20	-30	-40	-50	-60	-70	-80	-90	-100	1	-10	-10	100	80	
f			3	0	4	1	2	3	6	5	9	3	7	10	7	14	13	15	12	6	1	Σf (N) 121	Σy' 469	Σy'² 4109	Σ+x'y' 3575	Σ−x'y' 2	
d	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7	8	9	10						
x'			-24	-0	-24	-5	-8	-9	-12	-5		3	14	30	28	70	78	105	96	54	10	Σx' 401			Σx'y' 3573		
x'²			192	0	144	25	32	27	24	5		3	28	90	112	350	468	735	768	486	100	Σx² 3589					

$$\frac{\Sigma x'}{N} = \frac{401}{} = 3.314$$

$$\left(\frac{\Sigma x'}{N}\right)^2 = (3.314)^2 = 10.983$$

$$\frac{\Sigma x'^2}{N} = \frac{3589}{121} = 29.661$$

$$\frac{\Sigma y'}{N} = \frac{469}{121} = 3.876$$

$$\left(\frac{\Sigma y'}{N}\right)^2 = (3.876)^2 = 15.023$$

$$\frac{\Sigma y'^2}{N} = \frac{4109}{121} = 33.959$$

$$\frac{\Sigma x'y'}{N} = \frac{3573}{121} = 29.529$$

$$\sigma_x = \sqrt{\frac{\Sigma x'^2}{N} - \left(\frac{\Sigma x'}{N}\right)^2} = \sqrt{18.678}$$

$$= 4.322$$

$$\sigma_y = \sqrt{\frac{\Sigma y'^2}{N} - \left(\frac{\Sigma y'}{N}\right)^2} = \sqrt{18.936}$$

$$= 4.351$$

$$r = \frac{\frac{\Sigma x'y'}{N} - \left(\frac{\Sigma x'}{N}\right)\left(\frac{\Sigma y'}{N}\right)}{\sigma_x \cdot \sigma_y}$$

$$= \frac{29.529 - (3.314)(3.876)}{4.322 \times 4.351}$$

$$= \boxed{.887}$$

$$\sigma_r = \frac{1-r^2}{\sqrt{N}} = \frac{1-}{\sqrt{}}$$

$$= \_\_\_\_\_ =$$

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CORRELATION CHART FOR COMPUTATION OF PEARSON PRODUCT-MOMENT COEFFICIENT OF CORRELATION

X = Total Visual
Y = Word Pronunciation

X SCALE REPRESENTS _____

Y SCALE REPRESENTS	2-10	11-19	20-28	29-37	38-46	47-55	56-64	65-73	74-82	83-91	92-100	101-109	110-118	119-127	128-136	137-145	146-154	155-163				f	d	y'	y'²	x'y' +	x'y' −
	-100	-90	-80	-70	-60	-50	-40	-30	-20	-10		10	20	30	40	50	60	70	80	90	100		10				
	-90	-81	-72	-63	-54	-45	-36	-27	-18	-9		9	18	27	36	45	54	63	72	81	90		9				
59-61	-80	-72	-64	-56	-48	-40	-32	-24	-16	-8		8	16	24	32	40	48	56	64	72	80	6	8	48	384	200	
56-58	-70	-63	-56	-49	-42	-35	-28	-21	-14	-7		7	14	21	28	35	42	49	56	63	70	20	7	140	980	336	
53-55	-60	-54	-48	-42	-36	-30	-24	-18	-12	-6		6	12	18	24	30	36	42	48	54	60	16	6	96	576	30	
50-52	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5		5	10	15	20	25	30	35	40	45	50	17	5	85	425		115
47-49	-40	-36	-32	-28	-24	-20	-16	-12	-8	-4		4	8	12	16	20	24	28	32	36	40	8	4	32	128		48
44-46	-30	-27	-24	-21	-18	-15	-12	-9	-6	-3		3	6	9	12	15	18	21	24	27	30	17	3	51	153		96
41-43	-20	-18	-16	-14	-12	-10	-8	-6	-4	-2		2	4	6	8	10	12	14	16	18	20	1	2	2	4	6	
38-40	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7	8	9	10	4	1	4	4		15
35-37																						6					
32-34	10	9	8	7	6	5	4	3	2	1		-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	4	-1	-4	4	14	
29-31	20	18	16	14	12	10	8	6	4	2		-2	-4	-6	-8	-10	-12	-14	-16	-18	-20	5	-2	-10	20	16	
26-28	30	27	24	21	18	15	12	9	6	3		-3	-6	-9	-12	-15	-18	-21	-24	-27	-30	2	-3	-6	18		3
23-25	40	36	32	28	24	20	16	12	8	4		-4	-8	-12	-16	-20	-24	-28	-32	-36	-40	4	-4	-16	64	44	
20-22	50	45	40	35	30	25	20	15	10	5		-5	-10	-15	-20	-25	-30	-35	-40	-45	-50	3	-5	-15	75	55	
17-19	60	54	48	42	36	30	24	18	12	6		-6	-12	-18	-24	-30	-36	-42	-48	-54	-60	4	-6	-24	144	48	
14-16	70	63	56	49	42	35	28	21	14	7		-7	-14	-21	-28	-35	-42	-49	-56	-63	-70	0	-7				
11-13	80	72	64	56	48	40	32	24	16	8		-8	-16	-24	-32	-40	-48	-56	-64	-72	-80	3	-8	-24	192	80	
8-10	90	81	72	63	54	45	36	27	18	9		-9	-18	-27	-36	-45	-54	-63	-72	-81	-90	0	-9				
5-7	100	90	80	70	60	50	40	30	20	10		-10	-20	-30	-40	-50	-60	-70	-80	-90	-100	0	-10				
2-4				77																		1	-11	-11	121	77	
f	3	3	2	2	2	6	5	11	16	9	11	15	9	14	5	4	3	1				Σf (N) 121	Σy' 348	Σy'² 3292		Σ+x'y' 906	Σ−x'y' 277
d	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7	8	9	10						
x'	-30	-27	-16	-14	-12	-30	-20	-33	-32	-9		15	18	42	20	20	18	7				Σx' -83				Σx'y' 629	
x'²	300	243	128	98	72	150	80	99	64	9		15	36	126	80	100	108	49				Σx'² 1757					

$$\frac{\Sigma x'}{N} = \frac{-83}{121} = -.686$$

$$\left(\frac{\Sigma x'}{N}\right)^2 = (-.686)^2 = .471$$

$$\frac{\Sigma x'^2}{N} = \frac{1757}{121} = 14.521$$

$$\frac{\Sigma y'}{N} = \frac{348}{121} = 2.876$$

$$\left(\frac{\Sigma y'}{N}\right)^2 = (2.876)^2 = 8.271$$

$$\frac{\Sigma y'^2}{N} = \frac{3292}{121} = 27.207$$

$$\frac{\Sigma x'y'}{N} = \frac{629}{121} = 5.198$$

$$\sigma_x = \sqrt{\frac{\Sigma x'^2}{N} - \left(\frac{\Sigma x'}{N}\right)^2} = \sqrt{14.521 - .471}$$

$$= 3.748$$

$$\sigma_y = \sqrt{\frac{\Sigma y'^2}{N} - \left(\frac{\Sigma y'}{N}\right)^2} = \sqrt{27.207 - 8.271}$$

$$= 4.351$$

$$r = \frac{\frac{\Sigma x'y'}{N} - \left(\frac{\Sigma x'}{N}\right)\left(\frac{\Sigma y'}{N}\right)}{\sigma_x \cdot \sigma_y}$$

$$= \frac{5.198 - (-.686)(2.876)}{(3.748)(4.351)}$$

$$= \boxed{.440}$$

$$\sigma_r = \frac{1-r^2}{\sqrt{N}} = \frac{1-}{\sqrt{\ }}$$

$$= \_\_\_\_\_ =$$

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Correlation Chart for Computation of Pearson Product-Moment Coefficient of Correlation

X = Total Auditory
Y = Spelling

X SCALE REPRESENTS _____

	105-113	114-122	123-131	132-140	141-149	150-158	159-167	168-176	177-185	186-194	195-203	204-212	213-221	222-230	231-239	240-248	249-257	258-266	267-275	276-284		f	d	y'	y'²	x'y' +	x'y' −
	-100	-90	-80	-70	-60	-50	-40	-30	-20	-10		10	20	30	40	50	60	70	80	90	100		10				
	-90	-81	-72	-63	-54	-45	-36	-27	-18	-9		9	18	27	36	45	54	63	72	81	90		9				
	-80	-72	-64	-56	-48	-40	-32	-24	-16	-8		8	16	24	32	40	48	56	64	72	80		8				
	-70	-63	-56	-49	-42	-35	-28	-21	-14	-7		7	14	21	28	35	42	49	56	63	70		7				
	-60	-54	-48	-42	-36	-30	-24	-18	-12	-6		6	12	18	24	30	36	42	48	54	60		6				
33-34	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5		5	10	15	20	25	30	35	40	45	50	19	5	95	475	655	
31-32	-40	-36	-32	-28	-24	-20	-16	-12	-8	-4		4	8	12	16	20	24	28	32	36	40	31	4	124	496	796	
29-30	-30	-27	-24	-21	-18	-15	-12	-9	-6	-3		3	6	9	12	15	18	21	24	27	30	36	3	108	324	561	
27-28	-20	-18	-16	-14	-12	-10	-8	-6	-4	-2		2	4	6	8	10	12	14	16	18	20	36	2	72	144	340	
25-26	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7	8	9	10	25	1	25	25	94	
23-24																						33					
21-22	10	9	8	7	6	5	4	3	2	1		-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	28	-1	-28	28		48
19-20	20	18	16	14	12	10	8	6	4	2		-2	-4	-6	-8	-10	-12	-14	-16	-18	-20	21	-2	-42	84		36
17-18	30	27	24	21	18	15	12	9	6	3		-3	-6	-9	-12	-15	-18	-21	-24	-27	-30	28	-3	-84	252	18	
15-16	40	36	32	28	24	20	16	12	8	4		-4	-8	-12	-16	-20	-24	-28	-32	-36	-40	21	-4	-84	336	240	
13-14	50	45	40	35	30	25	20	15	10	5		-5	-10	-15	-20	-25	-30	-35	-40	-45	-50	11	-5	-55	275	165	
11-12	60	54	48	42	36	30	24	18	12	6		-6	-12	-18	-24	-30	-36	-42	-48	-54	-60	4	-6	-24	144	96	
9-10	70	63	56	49	42	35	28	21	14	7		-7	-14	-21	-28	-35	-42	-49	-56	-63	-70	5	-7	-35	245	266	
7-8	80	72	64	56	48	40	32	24	16	8		-8	-16	-24	-32	-40	-48	-56	-64	-72	-80	1	-8	-8	64	72	
5-6	90	81	72	63	54	45	36	27	18	9		-9	-18	-27	-36	-45	-54	-63	-72	-81	-90	1	-9	-9	81	63	
	100	90	80	70	60	50	40	30	20	10		-10	-20	-30	-40	-50	-60	-70	-80	-90	-100		-10				

Y SCALE REPRESENTS _____

f	1	4	2	5	6	4	5	13	14	16	15	21	25	17	33	38	31	30	16	4		Σf (N)	Σy'	Σy'²	Σ+x'y'	Σ−x'y'
d	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7	8	9	10	300	55	2973	3366	84
x'	-10	-36	-16	-35	-36	-20	-20	-39	-28	-16		21	50	51	132	190	186	210	128	36		Σx' 748			Σx'y' 3282	
x'²	100	324	128	245	216	100	80	117	56	16		21	100	153	528	950	1116	1470	1024	324		Σx'² 7068				

$$\frac{\Sigma x'}{N} = \frac{748}{300} = 2.493$$

$$\left(\frac{\Sigma x'}{N}\right)^2 = (2.493)^2 = 6.215$$

$$\frac{\Sigma x'^2}{N} = \frac{7068}{300} = 23.56$$

$$\frac{\Sigma y'}{N} = \frac{55}{300} = .183$$

$$\left(\frac{\Sigma y'}{N}\right)^2 = (.183)^2 = .033$$

$$\frac{\Sigma y'^2}{N} = \frac{2973}{300} = 9.91$$

$$\frac{\Sigma x'y'}{N} = \frac{3282}{300} = 10.94$$

$$\sigma_x = \sqrt{\frac{\Sigma x'^2}{N} - \left(\frac{\Sigma x'}{N}\right)^2} = \sqrt{17.345} = 4.165$$

$$\sigma_y = \sqrt{\frac{\Sigma y'^2}{N} - \left(\frac{\Sigma y'}{N}\right)^2} = \sqrt{9.877} = 3.143$$

$$r = \frac{\frac{\Sigma x'y'}{N} - \left(\frac{\Sigma x'}{N}\right)\left(\frac{\Sigma y'}{N}\right)}{\sigma_x \cdot \sigma_y}$$

$$= \frac{10.94 - (2.493)(.183)}{3.143 \times 4.165}$$

$$= \boxed{.801}$$

$$\sigma_r = \frac{1-r^2}{\sqrt{N}} = \frac{1-}{\sqrt{}}$$

$$= \frac{}{} =$$

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Correlation Chart for Computation of Pearson Product-Moment Coefficient of Correlation

X = Total Visual
Y = Spelling

X SCALE REPRESENTS _____

	2-10	11-19	20-28	29-37	38-46	47-55	56-64	65-73	74-82	83-91	92-100	101-109	110-118	119-127	128-136	137-145	146-154	155-163				f	d	y'	y'²	x'y' +	x'y' −
	-100	-90	-80	-70	-60	-50	-40	-30	-20	-10		10	20	30	40	50	60	70	80	90	100		10				
	-90	-81	-72	-63	-54	-45	-36	-27	-18	-9		9	18	27	36	45	54	63	72	81	90		9				
	-80	-72	-64	-56	-48	-40	-32	-24	-16	-8		8	16	24	32	40	48	56	64	72	80		8				
	-70	-63	-56	-49	-42	-35	-28	-21	-14	-7		7	14	21	28	35	42	49	56	63	70		7				
33-34	-60	-54	-48	-42	-36	-30	-24	-18	-12	-6		6	12	18	24	30	36	42	48	54	60	19	6	114	684	360	
31-32	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5		5	10	15	20	25	30	35	40	45	50	31	5	155	775	205	
29-30	-40	-36	-32	-28	-24	-20	-16	-12	-8	-4		4	8	12	16	20	24	28	32	36	40	36	4	144	576	216	
27-28	-30	-27	-24	-21	-18	-15	-12	-9	-6	-3		3	6	9	12	15	18	21	24	27	30	36	3	108	324	54	
25-26	-20	-18	-16	-14	-12	-10	-8	-6	-4	-2		2	4	6	8	10	12	14	16	18	20	25	2	50	100		56
23-24	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7	8	9	10	33	1	33	33		36
21-22																						28					
19-20	10	9	8	7	6	5	4	3	2	1		-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	21	-1	-21	21	50	
17-18	20	18	16	14	12	10	8	6	4	2		-2	-4	-6	-8	-10	-12	-14	-16	-18	-20	28	-2	-56	112	156	
15-16	30	27	24	21	18	15	12	9	6	3		-3	-6	-9	-12	-15	-18	-21	-24	-27	-30	21	-3	-63	189	117	
13-14	40	36	32	28	24	20	16	12	8	4		-4	-8	-12	-16	-20	-24	-28	-32	-36	-40	11	-4	-44	176	108	
11-12	50	45	40	35	30	25	20	15	10	5		-5	-10	-15	-20	-25	-30	-35	-40	-45	-50	4	-5	-20	100	75	
9-10	60	54	48	42	36	30	24	18	12	6		-6	-12	-18	-24	-30	-36	-42	-48	-54	-60	5	-6	-30	180	222	
7-8	70	63	56	49	42	35	28	21	14	7		-7	-14	-21	-28	-35	-42	-49	-56	-63	-70	1	-7	-7	49	49	
5-6	80	72	64	56	48	40	32	24	16	8		-8	-16	-24	-32	-40	-48	-56	-64	-72	-80	1	-8	-8	64	48	
	90	81	72	63	54	45	36	27	18	9		-9	-18	-27	-36	-45	-54	-63	-72	-81	-90		-9				
	100	90	80	70	60	50	40	30	20	10		-10	-20	-30	-40	-50	-60	-70	-80	-90	-100		-10				

Y SCALE REPRESENTS

f	3	8	7	7	8	11	16	21	34	27	34	33	22	30	19	11	7	2							
d	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7	8	9	10				
x'	-30	-72	-56	-49	-48	-55	-64	-63	-68	-27		33	44	90	76	55	42	14							
x'²	300	648	448	343	288	275	256	189	136	27		33	88	270	304	275	252	98							

Σf (N)	Σy'	Σy'²	Σ+x'y'	Σ−x'y'
300	355	3383	1660	92

Σx'	Σx'²	Σx'y'
−178	4230	1568

$$\frac{\Sigma x'}{N} = \frac{-178}{300} = -.593$$

$$\left(\frac{\Sigma x'}{N}\right)^2 = (-.593)^2 = .352$$

$$\frac{\Sigma x'^2}{N} = \frac{4230}{300} = 14.1$$

$$\frac{\Sigma y'}{N} = \frac{355}{300} = 1.183$$

$$\left(\frac{\Sigma y'}{N}\right)^2 = (1.183)^2 = 1.399$$

$$\frac{\Sigma y'^2}{N} = \frac{3383}{300} = 11.277$$

$$\frac{\Sigma x'y'}{N} = \frac{1568}{300} = 5.227$$

$$\sigma_x = \sqrt{\frac{\Sigma x'^2}{N} - \left(\frac{\Sigma x'}{N}\right)^2} = \sqrt{13.748}$$

$$= 3.708$$

$$\sigma_y = \sqrt{\frac{\Sigma y'^2}{N} - \left(\frac{\Sigma y'}{N}\right)^2} = \sqrt{9.878}$$

$$= 3.143$$

$$r = \frac{\frac{\Sigma x'y'}{N} - \left(\frac{\Sigma x'}{N}\right)\left(\frac{\Sigma y'}{N}\right)}{\sigma_x \cdot \sigma_y}$$

$$= \frac{5.227 - (-.593)(1.183)}{3.708 \times 3.143}$$

$$= \boxed{.509}$$

$$\sigma_r = \frac{1-r^2}{\sqrt{N}} = \frac{1-}{\sqrt{}}$$

$$= \_\_\_\_\_ =$$

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CORRELATION CHART FOR COMPUTATION OF PEARSON PRODUCT-MOMENT COEFFICIENT OF CORRELATION

X = Total Auditory
Y = Total Visual

X SCALE REPRESENTS Total Auditory

Y SCALE REPRESENTS Total Visual

			1–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80	81–90	91–100	101–110	111–120	121–130	131–140	141–150	151–160	161–170			f	d	y'	y'²	x'y' +	x'y' −
	-100	-90	-80	-70	-60	-50	-40	-30	-20	-10		10	20	30	40	50	60	70	80	90	100		10				
	-90	-81	-72	-63	-54	-45	-36	-27	-18	-9		9	18	27	36	45	54	63	72	81	90		9				
271–280	-80	-72	-64	-56	-48	-40	-32	-24	-16	-8		8	16	24	32	40	48	56	64	72	80	9	8	72	576	368	
261–270	-70	-63	-56	-49	-42	-35	-28	-21	-14	-7		7	14	21	28	35	42	49	56	63	70	32	7	224	1568	560	
251–260	-60	-54	-48	-42	-36	-30	-24	-18	-12	-6		6	12	18	24	30	36	42	48	54	60	29	6	174	1044	306	
241–250	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5		5	10	15	20	25	30	35	40	45	50	46	5	230	1150	345	
231–240	-40	-36	-32	-28	-24	-20	-16	-12	-8	-4		4	8	12	16	20	24	28	32	36	40	37	4	148	592	220	
221–230	-30	-27	-24	-21	-18	-15	-12	-9	-6	-3		3	6	9	12	15	18	21	24	27	30	17	3	51	153		6
211–220	-20	-18	-16	-14	-12	-10	-8	-6	-4	-2		2	4	6	8	10	12	14	16	18	20	25	2	50	100	12	
201–210	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7	8	9	10	24	1	24	24		18
191–200																						22					
181–190	10	9	8	7	6	5	4	3	2	1		-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	13	-1	-13	13	19	
171–180	20	18	16	14	12	10	8	6	4	2		-2	-4	-6	-8	-10	-12	-14	-16	-18	-20	15	-2	-30	60	72	
161–170	30	27	24	21	18	15	12	9	6	3		-3	-6	-9	-12	-15	-18	-21	-24	-27	-30	8	-3	-24	72	6	
151–160	40	36	32	28	24	20	16	12	8	4		-4	-8	-12	-16	-20	-24	-28	-32	-36	-40	5	-4	-20	80	24	
141–150	50	45	40	35	30	25	20	15	10	5		-5	-10	-15	-20	-25	-30	-35	-40	-45	-50	6	-5	-30	150	10	
131–140	60	54	48	42	36	30	24	18	12	6		-6	-12	-18	-24	-30	-36	-42	-48	-54	-60	5	-6	-30	180	54	
121–130	70	63	56	49	42	35	28	21	14	7		-7	-14	-21	-28	-35	-42	-49	-56	-63	-70	3	-7	-21	147	98	
111–120	80	72	64	56	48	40	32	24	16	8		-8	-16	-24	-32	-40	-48	-56	-64	-72	-80	3	-8	-24	192	104	
101–110	90	81	72	63	54	45	36	27	18	9		-9	-18	-27	-36	-45	-54	-63	-72	-81	-90	1	-9	-9	81	54	
	100	90	80	70	60	50	40	30	20	10		-10	-20	-30	-40	-50	-60	-70	-80	-90	-100		-10				
f			3	8	8	8	12	9	27	33	31	35	40	23	32	19	6	5	1			Σf (N) 300		Σy' 772	Σy'² 6182	Σ+x'y' 2252	Σ−x'y' 24
d	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1		1	2	3	4	5	6	7	8	9	10					Σx'y' 2228	
x'			-24	-56	-48	-40	-48	-27	-54	-33		35	80	69	128	95	36	35	8			Σx' 156					
x'²			192	392	288	200	192	81	108	33		35	160	207	512	475	216	245	64			Σx'² 3400					

$$\frac{\Sigma x'}{N} = \frac{156}{300} = .52$$

$$\left(\frac{\Sigma x'}{N}\right)^2 = (.52)^2 = .270$$

$$\frac{\Sigma x'^2}{N} = \frac{3400}{300} = 11.33$$

$$\frac{\Sigma y'}{N} = \frac{772}{300} = 2.573$$

$$\left(\frac{\Sigma y'}{N}\right)^2 = (2.573)^2 = 6.62$$

$$\frac{\Sigma y'^2}{N} = \frac{6182}{300} = 20.607$$

$$\frac{\Sigma x'y'}{N} = \frac{2228}{300} = 7.427$$

$$\sigma_x = \sqrt{\frac{\Sigma x'^2}{N} - \left(\frac{\Sigma x'}{N}\right)^2} = \sqrt{11.06}$$

$$= 3.326$$

$$\sigma_y = \sqrt{\frac{\Sigma y'^2}{N} - \left(\frac{\Sigma y'}{N}\right)^2} = \sqrt{13.987}$$

$$= 3.74$$

$$r = \frac{\frac{\Sigma x'y'}{N} - \left(\frac{\Sigma x'}{N}\right)\left(\frac{\Sigma y'}{N}\right)}{\sigma_x \cdot \sigma_y}$$

$$= \frac{7.427 - (.52)(2.573)}{3.740 \times 3.326}$$

$$= \boxed{.489}$$

$$\sigma_r = \frac{1 - r^2}{\sqrt{N}} = \frac{1 -}{\sqrt{}}$$

$$= \_\_\_\_\_ =$$

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